

A MONOGRAPH OF THE AMERICAN SPECIES OF THE GENUS *DYSCHORISTE*¹

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INTRODUCTION

Any attempt to determine specifically herbarium specimens of the genus under present consideration formerly proved very unsatisfactory because of the inadequacy of many of the original descriptions and also because of the small representation of type or authentic material in American herbaria. These facts, along with an especial interest in the genus and its allies, led to the present study. At first it was hoped that a monographic treatment of the whole genus might be made. A general survey of the material deposited in American herbaria, however, showed the Old World species to be so poorly represented that it was deemed advisable to exclude them from the present discussion and to include only the American species. Later the writer plans to visit some of the larger European herbaria and to supplement this monograph by a critical study of the far-eastern species.

This investigation was made possible only through the coöperation of the botanists connected with the various herbaria from which material was borrowed. Sincere appreciation is due Dr. B. L. Robinson of the Gray Herbarium, W. R. Maxon of the United States National Herbarium, and D. C. Davies, Director of the Field Museum, who so willingly loaned their entire collections of *Dyschoriste* for this study. It was found necessary also to borrow types, and to obtain fragments and photographs of type collections from several European herbaria. Dr. Santiago Ramón y Cajal, Instituto Cajal, Madrid, and Professor Eduardo Balguerias y Quesada, Jardin Botanico, Universidad de Madrid,

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very kindly furnished an excellent photograph of a little-known species, the type of which is preserved in the Madrid Herbarium. Professor Boris Fedtschenko, Jardin Botanique Principal, Leningrad, U.S.S.R., obligingly supplied two types essential for the completion of this monograph. Dr. A. W. Hill and T. A. Sprague, Royal Botanic Gardens, Kew, Dr. L. Diels, Botanischer Garten und Museum zu Berlin-Dahlem, Dr. C. H. Ostenfeld and Dr. Carl Christensen, Botanisk Garten, Københavns Universitet, as well as Dr. Adele Lewis Grant, Huguenot College, South Africa, who so willingly made critical comparisons with types at the Kew Herbarium on her journey to Africa, have all contributed either directly or indirectly, in material loaned or in verification of specimens submitted for comparison. The writer takes this opportunity to express his gratitude for their generosity and kindly assistance.

This study was made at the Missouri Botanical Garden, and thanks are due to the Director, Dr. George T. Moore, for the use of the excellent library and herbarium facilities which this institution affords. Also, especial thanks are extended to the Curator of the Herbarium, Dr. Jesse M. Greenman, under whose constant guidance and supervision this work has been made possible.

HISTORY

The genus *Dyschoriste* was proposed by Nees in the third volume of Wallich's 'Plantae Asiaticae Rariores' ¹ published in 1832. The genus was segregated from *Ruellia* on account of stamen, corolla, and fruit characters, and was based on *Ruellia depressa* Wallich, namely, Wallich's No. 2379 from East India, which, however, is not conspecific with *Ruellia depressa* L. Two other East Indian species, *D. cernua* and *D. litoralis*, were referred by Nees in the same work to his new genus.

In 1833, only a year later, David Don in Sweet's 'British Flower Garden' ² described the genus *Calophanes*. Don's new genus was also a segregate from *Ruellia*, and was founded on *Ruellia oblongifolia* Michaux, which in turn was based on specimens collected in the state of Georgia.

¹ Wallich, N. Pl. As. Rar. 3: 81. 1832.

² Sweet, R. Brit. Fl. Gard. II, 2: 181, pl. 181. 1833.

These two generic names were current in botanical literature for many years, as representing two supposedly distinct genera indigenous to remote regions—*Dyschoriste* of the eastern hemisphere and *Calophanes* of the western hemisphere. Nees, the foremost student in his time of the Acanthaceae, in his treatment of this family for Martius' 'Flora Brasiliensis,'¹ in 1847, accepted *Calophanes* and described seven Brazilian species of this genus. The same author and in the same year elaborated the Acanthaceae for DeCandolle's 'Prodromus'² and maintained both names as representing separate and distinct genera. In this work, which was the first to present a comprehensive treatment of the group, five species of *Dyschoriste* and twenty-seven species of *Calophanes*, as well as several varieties, were recognized.

Bentham and Hooker in the 'Genera Plantarum,'³ 1876, treated these two previously supposed distinct generic elements as congeneric, but unfortunately they took up the later name *Calophanes* and relegated *Dyschoriste* to synonymy.

Mr. C. B. Clarke, who contributed the treatment of the Acanthaceae for Hooker's 'Flora of British India,'⁴ 1885, followed Bentham and Hooker's generic interpretation of the group and recognized four East Indian species of *Calophanes*, namely, *C. Nagchana* Nees, *C. littoralis* T. Anders., *C. vagans* Wight, and *C. Dalzellii* T. Anders. Under *C. Nagchana* Nees the following species are cited as synonyms: *C. depressa* T. Anders., *Ruellia Nagchana* Ham., *R. erecta* Burm., *R. depressa* and *R. cernua* Nees, *Dipteracanthus Nagchana* Nees, *Dyschoriste depressa*, and *D. cernua* Nees.

In 1891, Dr. O. Kuntze⁵ revived the name *Dyschoriste* Nees and transferred thereto several species, including *Ruellia erecta* Burm. which was described and illustrated in 1768, being the oldest known species of this group. Lindau, in 1895, in reviewing the Acanthaceae for Engler and Prantl's 'Die Natürlichen Pflanzenfamilien,'⁶ followed Kuntze in recognizing the genus *Dyschoriste*.

¹ Martius, C. F. P. de. Fl. Bras. 9: 26. 1847.

² DeCandolle, A. P. Prodr. 11: 106, 107. 1847.

³ Bentham, G. & Hooker, J. D. Gen. Pl. 2: 1077. 1876.

⁴ Hooker, J. D. Fl. Brit. India 4: 410. 1885.

⁵ Kuntze, O. Rev. Gen. Pl. 2: 486. 1891.

⁶ Engler, A. & Prantl, K. Nat. Pflanzenfam. 4^{3b}: 302. 1895.

Clarke, in working up the Acanthaceae for the 'Flora Capensis,'¹ 1901, took up the name *Dyschoriste*, thus reversing the position taken by him in Hooker's 'Flora of British India,' mentioned above. He recognized *D. depressa* Nees as a valid species along with four other African species, one of which is *D. erecta* Clarke, thus apparently disregarding the *D. erecta* (Burm.) O. Ktze.

Several new species have been described from time to time and referred to either *Dyschoriste* or *Calophanes*, but no comprehensive treatment of the group as a whole has been published since that of Nees in DeCandolle's 'Prodromus.'

Assuming that there is absolute identity and thus complete synonymy of the several elements which Clarke referred to *Calophanes Nagchana* in the 'Flora of British India,' then, as pointed out by Dr. Kuntze, the name *erecta*, as the oldest specific name involved, must be retained and the binomial *Dyschoriste erecta* (Burm.) O. Ktze. becomes the valid combination for the plant concerned and *D. depressa* (Wall.) Nees must be regarded as a synonym of it. Since this study has been confined to the American species we must admit the observations of Clarke and Kuntze and accept *Dyschoriste erecta* (Burm.) O. Ktze. as the type species of the genus until the eastern species in question can be examined.

GENERAL MORPHOLOGY

Roots.—The root system in the genus *Dyschoriste* is not very extensive. All the species are perennial and the roots, in turn, are of the simple fibrous form. By the casual observer, however, some of the slender underground stems of the previous year's growth are sometimes mistaken for roots.

Stems.—There is considerable variation in the stem and its habit of growth. In all cases, the stem or stems arise from a ligneous perennial base. However, the mode of ascent varies. Many species are prostrate and the stems spread over the ground in several directions. In these cases the leaves assume a secund position. Often when the stems are short a rosette appearance is attained for the whole plant. The species *D. oaxacensis* illus-

¹ Flora Capensis 5¹: 15. 1901.

trates this character. However, it is not a stable specific characteristic. A second habit of growth is the ascending type. It is in this category that the majority of species is placed. The stem not infrequently becomes more or less geniculate; this mode of growth is very characteristic of *D. Pringlei*. The third habit of growth is the erect type. It is to this type that the sturdy *D. hirsutissima*, *D. oblongifolia*, *D. ovata*, and *D. trichanthera* belong. Some species may follow consistently a distinct habit of growth, while others may have the stems ascending or erect even on the same plant. One can usually associate stem growth exceeding a length of 4–5.5 dm. with the erect habit, and shorter stems with the ascending or prostrate habit. Along with this, the prostrate type will possess small leaves and the erect type will have leaves with a more extensive surface.

Several species, among them *D. oblongifolia*, possess slender underground stems which are common in perennials. These stems have the appearance of roots but on close observation buds and modified leaves can be seen. After passing under the ground for some distance they come to the surface and then rise erect.

The stem may be terete or quadrangular. The latter is the more common type in the genus. In the species *D. quadrangularis* the stem is not only angular but the angles are winged. This condition is probably brought about by the decurrent petiole of the leaf extending down the stem.

Leaves.—The leaves of the species in the genus *Dyschoriste* present a great variety of differences. All species have leaves with entire margins, except *D. bilabiata* which is not distinctly dentate but has a decided tendency in that direction. Several species, such as *D. crenulata* and *D. hirsutissima*, show a tendency toward crenulate margins. Others combine the crenulate with the repand margin. Along with these characteristics the margin is usually ciliate. In shape the leaf varies from that of the narrow, linear *D. angusta*, *D. Greenmanii*, and *D. Purpusii* to that of the oblong-ovate *D. quadrangularis* which grows to a length of 10 centimeters. Some species have two types of leaves, the lower or cauline leaves often being larger and different in shape from the upper leaves in whose axils branches and flowers are crowded.

The surface of the leaf itself is usually pubescent. When the pubescence is sparse or absent, an abundance of cystoliths is usually seen. Often the cystoliths, since they lack an orderly arrangement, are mistaken for appressed hairs. This cystolithic character is not sufficiently definite for specific delimitation. Some plants have a more copious formation of cystoliths than others. This character exists on the stem and calyx as well as the leaves. The venation which is very pronounced on the lower surface varies very little within the genus. The usual form is the feather-veined type.

Inflorescence.—In all cases the flowers are axillary and subtended by bracts and sometimes bracteoles. Only occasionally are the flowers solitary in the axils. There are usually several to many flowers at the node, giving the appearance of a cymose cluster as in *D. quadrangularis* or a capitulum as in *D. capitata* and *D. pinetorum*. *D. Greenmanii* is an excellent example of a species with a solitary flower at the node. The majority of species have flowers which are pedicellate, often so short, however, that a sessile effect is presented.

Calyx.—In the calyx of *Dyschoriste* is found one of the most constant characters of the genus. It is usually five-parted and always persistent. The only deviation from the five-merous condition is found in *D. maranhonis* where the calyx-lobes are occasionally only four. In all cases the lobes are subulate-setaceous and usually ciliate. The ciliation may vary from a long whitish, flaccid pubescence to a very short hirsuteness. When the calyx proper is pubescent, the pubescence is usually confined to the nerves. The tissue connecting the lobes of the calyx is usually very membranaceous and tears apart very easily, making it difficult and quite unsatisfactory to use the ratio between tube-length and lobe-length as a character for specific differentiation. The lobes are usually quite equal in length. However, here again variation is found. Cystoliths, as in the leaves, are very abundant; but in the calyx they are frequently disposed in a more or less regular arrangement.

Corolla.—There is very little differentiation to be found in the corolla of the genus. In most cases the bilabiate type occurs. This, however, is not as distinct as in some other genera of the

Acanthaceae. The corolla is five-lobed, the two posterior lobes being coalescent to a greater extent than the three anterior lobes. The length of the corolla varies from 10 to 17 mm., as found in *D. decumbens*, *D. hygrophiloides*, *D. saltuensis*, *D. quadrangularis*, and *D. angustata*, to 25–28 mm., exemplified in *D. xylopoda*, *D. humilis*, and *D. ovata*. One species, *D. Pringlei*, has a corolla measuring 35–38 millimeters long. None, however, reach the length of 70–80 millimeters as found in some of the Ruellias. The proportion between tube and throat is variable in the genus. The ventricose throat is found quite often. The condition should exist in all species because of the contiguity of the adnate filaments in the posterior portion of the throat and tube. This ventricosity, hence, is more pronounced in the larger-flowered species. The narrow tube of the corolla is usually slightly flared at the base to make room for the disc and ovary. The ampliation from the tube to the throat is very variable and may be abrupt or gradual according to the species. In all cases, the external surface is quite pubescent. In the species *D. trichanthera* the pubescence is found on the interior as well as the exterior surface of the throat.

Stamens.—The stamens are didynamous. The long and short filaments on each side are contiguous or united at the base by a membrane which extends from the point of adnation to the base of the corolla tube. A very distinctive feature of the anthers is the mucronate appendages at the base of the anther cells. These mucronate appendages are characteristic of the genus and are very easily seen with the hand-lens. Under the low power of the compound microscope they are found to be composed of several multicellular strands of cells closely compacted together. These strands of cells are easily torn apart, and a dentate or ragged appearance is given to the whole appendage. This is doubtless what Nees saw when he described the appendages of *D. quitensis* as “2–3-toothed.” A similar example was found in *D. Schiedeana*. On microscopic study, however, the so-called dentations were found to be nothing more than shreds of tissue torn away slightly from the compacted mass. The anther cells are usually parallel and oblong in shape. In the case of *D. sagittata* and *D. maranhonis* the cells are so disposed as to have a

sagittate appearance. In both the species mentioned the apex as well as the base is appendaged. As a rule the anther cells are glabrous but in the species *D. trichanthera* the anther cells are very pubescent. The mode of dehiscence is by a longitudinal slit on the side of the anther cell. The filaments are commonly pubescent.

Pistil.—There is little variation in the parts of the pistil. A disc is present beneath the ovary in all species. The ovary itself is two-celled, glabrous, and oblong. Little or no variation is found in the filiform pubescent style. Only the anterior lobe of the stigma is developed, and this lobe is usually linear and oblique with a flattened stigmatic surface. However, in *D. hygrophiloides* the stigma is curved, while in *D. sagittata* it is basally lobed. In *D. maranhonis* the stigma is reflexed.

Capsule.—The capsule of the genus is quite uniform. The constant linear, glabrous and four-seeded characters, combined with other diagnostic characters, help considerably in generic determination. Retinacula or hooked appendages on the median ridge of the valves hold the flat suborbicular seeds in place. When dry the seeds appear to have many soft, appressed hairs. These same hairs when wetted diverge, elongate, and become mucilaginous.

GEOGRAPHICAL DISTRIBUTION

The geographical distribution of the American species of the genus *Dyschoriste* offers very interesting problems. The accompanying maps demonstrate very clearly that there are three distinct areas of distribution: (1) southeastern United States; (2) southwestern United States and Mexico; and (3) South America.

Two species, namely, *Dyschoriste oblongifolia* and *D. angusta*, occur in the southeastern United States area. This area extends the width of the coastal plain from southern Virginia to southern Florida. The regions of distribution of the two species do not overlap. *D. angusta* is confined to the wet region of Dade and Palm Beach Counties in southern Florida, while *D. oblongifolia* extends northward through the remainder of the area, seeking the dry, sandy pine woods.



Fig. 2. Map showing the geographical distribution of the South American species of *Dyschoriste*.

to this area. It is an interesting fact that the distribution of some species is almost coincident with the geological formation of the country. *D. decumbens*, which occurs on the plateau

region between the Sierra Madre ranges, is an excellent example of this fact. *D. hirsutissima* extends from Sonora southward along the western slope of the Sierra Madre range to Oaxaca. Many species have a localized distribution only, *D. Greenmanii*, *D. crenulata*, *D. saltuensis*, and *D. angustifolia* being examples. Some of these localized areas are characterized by three or more species. An instance of this is a small region around Guadalajara in the state of Jalisco where four species are represented. Another illustration of limited areal distribution occurs in the northern part of Oaxaca which harbors *D. oaxacensis*, *D. angustifolia*, *D. capitata*, and *D. hirsutissima*. Many species, especially the localized ones, appear to be extremely edaphic since they inhabit only regions near volcanoes. The center of distribution in this second area falls within the region represented by the states of Puebla, Michoacan, and Mexico.

The third and last area, namely that of South America, comprises more territory than either of the areas indicated above and includes the seventeen remaining species of the genus. The material examined in all cases was not very copious, hence an accurate range of geographical distribution of these species could not definitely be ascertained. Nearly all species appear to occur in isolated and limited areas, but the relationship between some of these areas indicates that a greater overlapping of areas would occur were it not for the paucity of herbarium material. Three species, namely, *D. quitensis*, *D. ciliata*, and *D. repens*, are found in Peru and the Andes of Ecuador. *D. Niederleinii* and *D. humilis* are found in Argentina. The other thirteen species inhabit northern Paraguay and southern Brazil, and it is here that the South American center of distribution occurs.

An unusual feature of the geographical distribution is the isolation of the areas defined. At present, there is no one species which connects up any two areas. There seems to be no satisfactory explanation to account for the absence of the genus between the Andes of Ecuador and the Isthmus of Tehuantepec in Mexico. Members of the genus may be found between these two remote regions, but until the entire Andean range has been explored more thoroughly from a botanical standpoint one would hardly venture an explanation of the marked discontinuous distribution which the genus now presents.

The non-occurrence of the genus in the Mississippi Valley is equally surprising. Since the flora of this entire area is comparatively well known, it is hardly possible that the members of the genus would be overlooked if they there existed. The only solution seems to be the possible age of the genus. *Dyschoriste* is probably a pre-glacial genus which, prior to the Oligocene period of the Cenozoic era, extended continuously across the southern United States. However, the Eocene and Oligocene seas encroached upon the United States in the present Mississippi Valley, thereby splitting the distribution areas of the genus into two parts.

PHYLOGENY

Because of the large number of closely allied species in the genus *Dyschoriste* it is quite necessary that the phylogenetic discussion of the group be made from a purely hypothetical standpoint. The fact that the discussion is confined to the American species alone seconds this consideration, since the eastern species of the genus exceed the American species in number.

On account of the three distinct geographical distribution areas, which have been discussed before, a tree method of illustrating probable phylogenetic sequence proved unsatisfactory; hence the method used in the accompanying chart was devised finally to illustrate the apparent relationship of the species of the western hemisphere. This chart if superimposed on a map of the regions inhabited by the genus would coincide with the specific regional distribution.

It was felt reasonably certain that all species of the genus have evolved from a common ancestor designated in the chart as *x*. From this ancestor, species and groups of species have evolved. One might ask why, since the species seem to be placed in definite groups, subgenera or sections have not been designated. This question was given much thought and consideration; it was felt finally, however, that on account of the relative uniformity of the essential morphological characters within the genus, except in the case of group II, no adequate basis exists for the designation of subgenera or sections.

It may be observed that all the designated groups with the

exception of group II originated from the common ancestor at approximately the same time. Group II, on account of the muticous character of its anther appendages, the extremely small leaves, the very small flowers, and the fruit characters, has been separated from the genus *Dyschoriste* and raised to the rank of a new genus which is considered as intermediate between the hypothetical type and *Dyschoriste* proper. In this genus, *Apassalus*,¹ containing three species, the species *Apassalus diffusus*

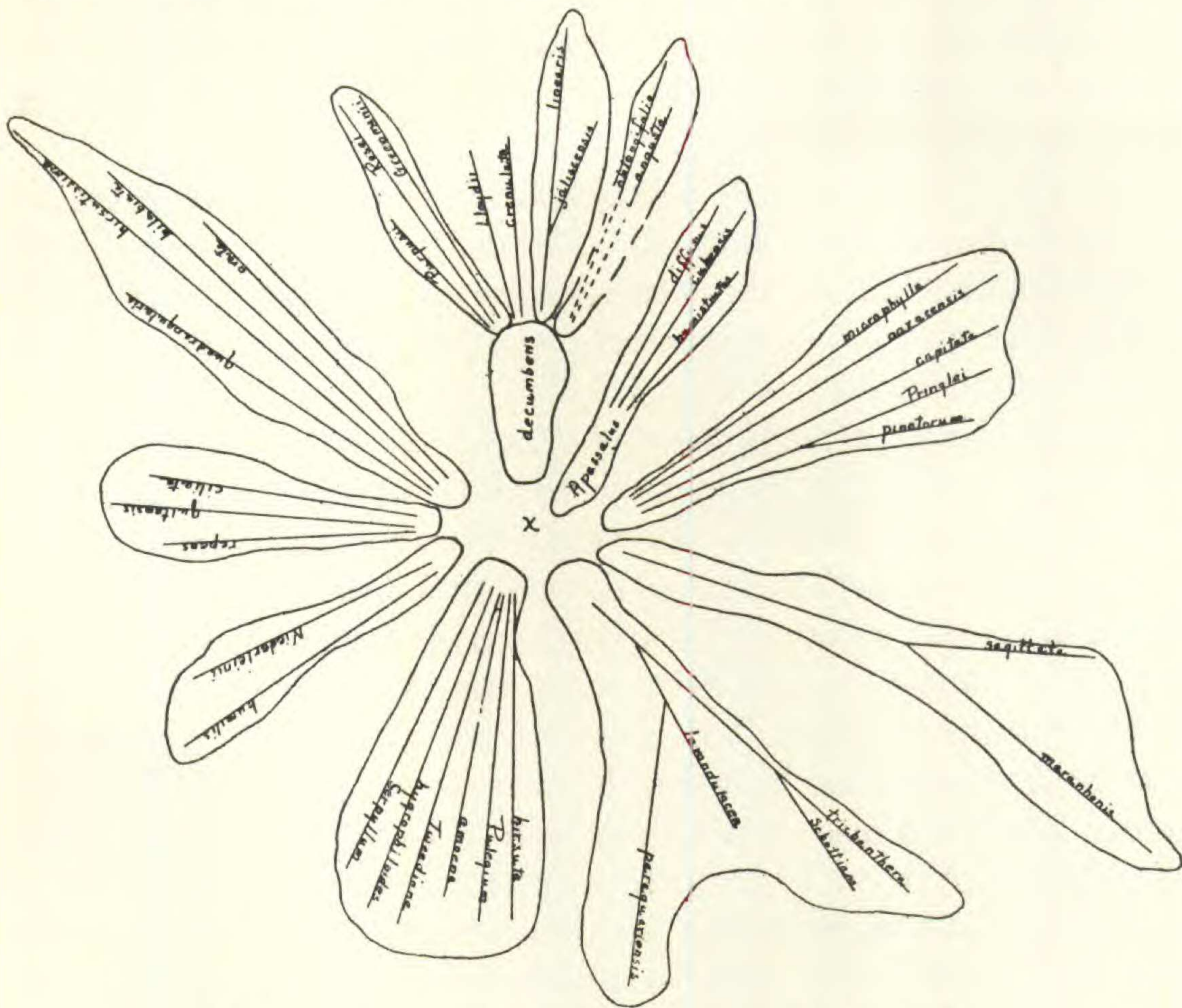


Fig. 3. Phylogenetic chart of the species of *Dyschoriste*.

has reached the highest development in the reduction of the number of ovules to two, one being borne in each valve of the capsule. The other two species contain the four seeds which are characteristic of the majority of species in the genus *Dyschoriste*. *Apassalus* is confined to the islands of Cuba and Haiti and to the southeastern United States.

¹See Kobuski, C. E. A new genus of the Acanthaceae. Ann. Mo. Bot. Gard. 15: 1-8, pl. 1-2. 1928.



Group I, involving ten species, is confined to the plateau regions of Mexico. In this instance *D. decumbens*, on account of its extended range and characteristic relation to all species concerned, is considered the base species. *D. Lloydii* and *D. crenulata* are species having vital characteristics similar to *D. decumbens* but differing sufficiently in minor characters to be considered direct descendants from the base species. A small group containing three species, *D. Purpusii*, *D. Greenmanii*, and *D. Rosei*, stands by itself. The highest development is reached in *D. Greenmanii* and *D. Rosei* in which cases the inflorescence has been reduced to a solitary flower at each node. All species of the last group have very slender linear leaves.

Another branch from *D. decumbens*, as the chart illustrates, is the *linearis-jaliscensis* branch. Although separated somewhat in regional distribution these two species are closely allied through their flower and foliage structures and are undoubtedly derived from *D. decumbens*.

The species *D. oblongifolia* and *D. angusta* seem to be closely related to *D. linearis*; in fact, *D. linearis* was once considered a variety of *D. oblongifolia*. However, the two species under discussion are confined to the southeastern United States in their distribution and, as the distribution map of North America shows, are not connected definitely with the Mexican-southwestern United States species. This suggests the probability that there may be a relationship between the two species in Florida and the genus *Apassalus* also found there and in the West Indies. The migration may have been northward through the Antilles, and a connecting link between the southeastern United States species and the southwestern United States-Mexico group may never have existed.

In group III, one finds an entirely different situation. Here we have four large, erect species, each showing a definite characteristic development toward advancement. Perhaps the highest development is found in *D. hirsutissima* which extends the length of the western Sierra Madre range and possesses a well-developed glandular pubescence. This is the only instance of this character in the whole genus. *D. bilabiata* and *D. quadrangularis* are close relatives but do not seem to have been derived from the *D. hir-*

sutissima line. Instead, they undoubtedly arose along parallel lines of development. In *D. bilabiata* we find a distinct dentation of the leaf. This group is also characterized by large, petiolate leaves, in some cases as long as ten centimeters, an unusual feature in the genus.

Group IV for the most part occurs in southwest Mexico, that is, the states of Oaxaca, Jalisco, and Michoacan. These species are the ascending foliose type with rather small, ovate leaves. The inflorescence is usually subcapitate, and it is sometimes difficult to distinguish off-hand the species here included. They all, with the exception of *D. pinetorum*, seem to have evolved along a parallel line of development. *D. pinetorum*, on account of its resemblance to *D. Pringlei*, undoubtedly evolved from it. It is in *D. Pringlei* that we find the largest flower of the genus *Dyschoriste*, and in this species a close resemblance is shown to the genus *Ruellia*. The highest point of development in the North American species just discussed is found, according to my opinion, in *D. hirsutissima*, *D. Greenmanii*, *D. Rosei*, and *D. linearis*.

In the South American species of the genus, a similar situation is found. Here the species can be placed in five groups. Group V contains the three species on the western coast inhabiting Peru and Ecuador. Specialization in them is not particularly noticeable. The species *D. ciliata* possesses rather muticous anther appendages. This would ally the species to the genus *Apassalus*. It was necessary to accept the word of Nees in this instance, however, as only a photograph of the type of the species could be obtained.

The species of Group VI are found in Argentina. Here *D. humilis* reaches the highest point of development in the reduced number of seeds. As in *Apassalus diffusus*, only two seeds are produced, a single seed occurring in each valve of the capsule.

Group VII is not unusual in its development. In this group are found six closely related species—perhaps interrelated—but showing no special development. Here again the herbarium material at hand is very sparse, the study in a few instances being confined to photographs.

In Group VIII are four species, two of which are described for

the first time. In the species *D. trichanthera* is found the spicate inflorescence along with pubescent anthers. The former character links it up with *D. Schottiana*, while the latter character shows the relationship which exists between *D. trichanthera* and *D. lavandulacea*. *D. paraguariensis* is undoubtedly a branch from *D. lavandulacea* but possesses more highly developed floral characters.

The last group, namely, group IX, includes only two species. It is here that the sagittate or divergent anther cells are found. The highest development of the group and probably the highest development in the genus is shown by *D. maranhonis*, in which both incomplete didynamy and reduction in corolla and calyxlobes are found. Nees describes *D. maranhonis* as being glandular-pubescent. A fragment of the type specimen was obtained and failed to demonstrate this character.

SUMMARY

The conclusions drawn as to the probable phylogeny of the group under consideration are reached after a comparative study of the outstanding morphological characters which may be summarized as follows:

- (1) Muticous appendaged anthers are more primitive than those with apiculate appendages.
- (2) Divergent anther cells are more advanced than parallel anther cells.
- (3) Glabrous anthers are more primitive than pubescent anthers.
- (4) Four-seeded capsules are more primitive than two-seeded capsules.
- (5) Numerous flowers in an axil is a more primitive condition than the solitary-flowered axil because the presence of bracts in the solitary-flowered species shows reduction to have taken place in the telescoping of the inflorescence.
- (6) An unlobed stigma is more advanced than the lobed stigma.
- (7) Entire-margined leaves are primitive. The dentate margin is an advancement, and the crenulate margin type is intermediate.
- (8) Glandulosity is more advanced than pilosity.

(9) Procumbent plants are more primitive than erect plants which have evolved through ascending plants.

(10) Complete didynamy is more primitive than incomplete didynamy.

(11) Winged stems are more advanced than the unwinged quadrangular stems.

(12) Reduction of corolla- and calyx-lobes from five to four is a criterion of specialization and advancement.

ABBREVIATIONS

The abbreviations used to indicate the herbaria in which the specimens cited in the present paper occur are as follows:

B = Botanischer Garten und Botanisches Museum, Berlin, Germany.

C = Botanisk Garten, Københavns Universitet, Copenhagen, Denmark.

Ch = University of Chicago (deposited in the Field Museum).

FM = Field Museum of Natural History.

G = Gray Herbarium of Harvard University.

K = Royal Botanic Gardens, Kew, England.

L = Jardin Botanique Principal, Leningrad, U.S.S.R.

M = Missouri Botanical Garden.

Ma = Jardin Botanico, Universidad de Madrid, Madrid, Spain.

US = United States National Herbarium.

TAXONOMY

Dyschoriste Nees in Wallich, Pl. As. Rar. 3: 75, 78. 1832; Nees in DeCandolle, Prodr. 11: 106. 1847; O. Kuntze, Rev. Gen. Pl. 2: 485. 1891; Lindau in Engl. & Prantl, Nat. Pflanzenfam. 4^{3b}: 302. 1895; Gray, Manual, ed. 7, 743. 1908.

Calophanes D. Don in Sweet, Brit. Fl. Gard. 2: pl. 181. 1833; Nees in Mart. Fl. Bras. 9: 25. 1847; Nees in DC. Prodr. 11: 107. 1847; Benth. & Hook. Gen. Pl. 2: 1077. 1873-76; C. B. Clarke in Hooker, Fl. Brit. India 4: 410. 1885; Gray, Syn. Fl. N. Am. 2¹: 324. 1878, and ed. 2, 1886; Chapman, Fl. Southeastern U.S., ed. 3, 365. 1897; Small, Fl. Southeastern U.S. ed. 1, 1082. 1903, and ed. 2, 1913.

Linostylis Fenzl. in *Linnaea* 23: 94. 1850.

Herbaceous, caulescent perennials, prostrate, ascending or erect, glabrous or pubescent. Leaves opposite, sessile or petioled, usually entire. Inflorescence cymose, capitate or spicate, terminal or axillary. Flowers subtended by foliaceous bracts and bracteoles. Calyx deeply 5-lobed, lobes usually subulate-setaceous, ciliate, lineolate. Corolla-tube usually erect, occasionally slightly amplified at the base; limb spreading, oblique, obscurely or distinctly bilabiate, 5-lobed. Stamens 4, didynamous; filaments of a long and short stem united at the base and adnate to the base of corolla-tube, pubescent; anther 2-celled, cells oblong, sharply mucronate at the base, parallel or slightly divergent, glabrous or occasionally pubescent. Ovary 2-celled, glabrous, ovules 2 or occasionally 1 in each cell; style filiform, pubescent; posterior lobe of stigma rudimentary, anterior lobe oblique, slightly flattened. Capsule included in the persistent calyx, oblong-linear, glabrous, 2-4-seeded, separating with difficulty at maturity into 2 valves, 1-2 seeds to each valve held in position by retinacula. Seeds flattened, suborbicular, mucilaginous when wetted.

Type species: *Dyschoriste erecta* (Burm.) O. Ktze. in *Rev. Gen. Pl.* 2: 485. 1891.

KEY TO SPECIES

1. Plants glandular-pubescent.....1. *D. hirsutissima*
Plants glabrous or pubescent but not glandular.....2
2. Inflorescence spicate.....3
Inflorescence not spicate.....4
3. Anther cells pubescent; internal surface of corolla-throat pubescent.
.....2. *D. trichanthera*
Anther cells glabrous; internal surface of corolla-throat glabrous.....3. *D. Schottiana*
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Leaves ovate, other than linear.....14
5. Corolla approximately 10 mm. long.....4. *D. angusta*
Corolla 15 mm. or more long.....6
6. Corolla 15-20 mm. long.....7
Corolla 25-30 mm. long.....11
7. Leaves 2 mm. or more wide.....8
Leaves 1 mm. or less wide.....5. *D. Purpusii*
8. Anther cells pubescent.....6. *D. lavandulacea*
Anther cells glabrous.....9
9. Stem glabrous, except for distinct pubescence at node; flowers solitary
at node.....7. *D. Greenmanii*
Stem evenly pubescent; flowers usually two or more at node.....10

10. Plants low-growing, ascending, 1 dm. or less high; style approximately 6 mm. long; S. Amer. sp. 8. *D. Niederleinii*
Plants strict, 3–6 dm. high; style approximately 12 mm. long; Mex. sp. 9. *D. Schiedeana*
11. Flowers characteristically solitary at the node. 10. *D. Rosei*
Flowers not solitary at the node. 12
12. Leaves mostly linear, 2 mm. or less wide. 11. *D. jaliscensis*
Leaves linear to linear-lanceolate, more than 3 mm. wide. 13
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Stem hirsute with rigid hairs. 13. *D. linearis*
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Leaves not distinctly dentate. 15
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Not cinereous-pubescent. 17
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Inflorescence other than capitate. 21
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Corolla 20–21 mm. long. 20
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Leaves pubescent, obovate-elliptic. 20. *D. pinetorum*
21. Corolla 15 mm. or less in length. 22
Corolla 20 mm. or more in length. 33
22. Leaves sessile. 23
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23. Plants with converging anther cells giving a sagittate appearance; stigma lobed. 21. *D. sagittata*
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24. Plants with glabrous leaves; S. Amer. sp. 22. *D. Serpyllum*
Plants with pubescent leaves; Mex. sp. 23. *D. Lloydii*
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Leaves pubescent. 28
26. Leaves 6–7 cm. long. 27
Leaves 1.5–3 cm. long. 24. *D. microphylla*
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Anthers only slightly calcarate at base; leaves ovate-elliptic; S. Amer. species. 26. *D. ciliata*
28. Stems winged; leaves approximately 10 cm. long. 27. *D. quadrangularis*
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Calyx tube pubescent, lobes ciliate with stiffish hairs; leaves ovate to rotund. 30
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- Anther cells parallel; corolla and calyx characters constant; complete
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31. Style approximately 5 mm. long.....32
Style 10 mm. or more long.....30. *D. hirsuta*
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.....31. *D. hygrophiloides*
Lower leaves ovate, obtuse but not emarginate at the apex.....32. *D. repens*
33. Calyx 9-10 mm. long.....33. *D. Pulegium*
Calyx 15 mm. or more long.....34
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Flowers usually in pairs at the nodes.....36
35. Stem erect; corolla barely exceeding or equalling the calyx in length;
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Stem geniculate-ascending; corolla 5 mm. or more longer than calyx;
S. Amer. sp.....35. *D. amoena*
36. Leaves pubescent.....37
Leaves glabrous.....39
37. Villous-pubescent throughout.....36. *D. xylopoda*
Plants not villous-pubescent.....38
38. Capsule 4-seeded; N. Amer. sp.....37. *D. oblongifolia*
Capsule 2-seeded; S. Amer. sp.....38. *D. humilis*
39. Leaves distinctly acuminate; the two bracts at each axil nearly equalling
the leaf in all characters.....39. *D. paraguariensis*
Leaves obtuse at apex; bracts foliate but not equalling the leaf in size.....40
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.....37a. *D. oblongifolia* f. *glabra*
Leaves petiolate; corolla 20 mm. long; S. Amer. sp.....40. *D. Tweediana*

1. *Dyschoriste hirsutissima* (Nees) O. Ktze. Rev. Gen. Pl. 2: 486. 1891.

Calophanes hirsutissimus Nees in DC. Prodr. 11: 109. 1847;
Hemsl. in Biol. Cent.-Am. Bot. 2: 502. 1882.

Calophanes bilobatus Rose in Contr. U.S. Nat. Herb. 1: 109. 1891.

Stems branching, ascending from a stout perennial base to a height of 10-12 dm., somewhat quadrangular, more or less pubescent with the pubescence, in some cases, restricted to the edges, occasionally glandular at the apex; leaves petioled, ovate to oblong-ovate, 3-8 cm. long, 1.5-3 cm. wide, acute at both ends, margin usually entire or slightly crenulate, sometimes slightly denticulate, pubescent on both surfaces, younger leaves often densely so and glandular; inflorescence axillary, subtended by glandular-pubescent, subulate bracts; calyx 5-lobed, subulate-setaceous, extremely glandular-pubescent, approximately 11 mm.

long, lobes more than one-half the total length of the calyx; corolla subbilabiate, puberulent on the outer surface, occasionally glandular, averaging 14 mm. in length, tube about the same length as the abruptly amplified throat; stamens adnate to a little below the middle of the corolla-throat; stigma oblique; capsule 4-seeded; seeds oblique.

Distribution: slopes of the Sierra Madre of western and southern Mexico.

Specimens examined:

Southwestern Chihuahua, Aug.-Nov. 1885, *Palmer 235* (G, US); Alamos, 180 miles s.e. from Guaymas, Sonora, alt. 418 m., 26 March-8 April, 1890, *Palmer 402* (G, US); Sierra de los Alamos Mt., 6 miles due south of town of Alamos, Sonora, 14 March, 1910, *Rose, Standley & Russell 12833* (US); dry hillside, Acaponeta, Tepic, 10 April, 1910, *Rose, Standley & Russell 14298* (US); dry rocky slopes near Guadalajara, Jalisco, 11 Dec. 1888, *Pringle 2154* (G); hills near Guadalajara, Jalisco, 15 Nov. 1889, *Pringle 2939* (FM, G); Cuernavaca, Morelos, 15 Nov. 1865, *Bourgeau 1262* (G); Cuicatlan, Oaxaca, alt. 1000 m., 9 Dec. 1895, *Gonzalez 43* (G); Monte Alban, Oaxaca, 1933 m., 23 Nov. 1894, *Pringle 6053* (G, M, US); Monte Alban, Oaxaca, alt. 2833 m., 24 Nov. 1894, *L. C. Smith 323* (G); Monte Alban, near Oaxaca City, Oaxaca, alt. 1900-2000 m., 23 Nov. 1894, *L. C. Smith 729* (M, US); Monte Alban, Oaxaca, 29 Dec. 1895, *Seler 1733* (G); Valle de Oaxaca, Oaxaca, alt. 1650 m., 18 Nov. 1906, *Conzatti 1521* (FM); Tehuantepec, June, 1906, *Gandoger* (M 120892); Hacienda de Guadalupe, date lacking, *Ehrenberg 1223* (B TYPE, M fragment and photograph).

2. *Dyschoriste trichanthera*¹ n. sp.

Pl. 4.

Dyschoriste maranhonis Lindau in Bull. Herb. Boiss. II. 3: 628. 1903, as to *Fiebrig 4856*, *Hassler 5908*, 7780, not O. Ktze.

Stems stout, branched, erect, 5-6 dm. high, glabrate, pubescent near the apex, basal portion densely covered with cystoliths, swollen at the nodes; leaves oblong-ovate to ovate, younger

¹ *Dyschoriste trichanthera* Kob., sp. nov., caulibus suffruticosis, erectis, 5-6 dm. altis, glabrescentibus, apice pubescentibus, inferiore cystolitherissimo, tumidis ad nodos; foliis oblongo-ovatis vel ovatis, 5-7 cm. longis, 2-3 cm. latis, integerrimis vel crenulatis, petiolis 10-12 mm. longis; floribus axillaribus, aliquot ad singulares nodos, fere prope apicem spicatis; bracteis parvis, foliaceis, ciliatis, pubescentibus, bracteolis acuminatis, 4-7 mm. longis; calyce 13-14 mm. longo, lobis subulatis, setaceis, 8-9

leaves pubescent, older leaves glabrate, 5–7 cm. long not including the petiole, 2–3 cm. wide, entire to crenulate, petiole 10–12 mm. long; flowers axillary, crowded at the nodes near the apex giving a spicate appearance; bracts small, foliaceous, ciliate and pubescent, bracteoles acuminate, 4–7 mm. long; calyx 13–14 mm. long, lobes subulate-setaceous, 8–9 mm. long, often recurved at the tip, ciliate, with 2 kinds of multicellular hairs, both flaccid and delicate; corolla distinctly bilabiate, 10–20 mm. long, rose or violet, lobes obtuse, emarginate, puberulent on external surface, distinctly pubescent on the internal surface; stamens barely included, adnate to about opposite the labiation of the corolla, anthers pubescent, style filiform, 10–20 mm. long, stigma oblique, linear; capsule not seen.

Distribution: along rivers, northern Paraguay.

Specimens examined:

In the region of the river Capivary, Paraguay, date lacking, *Hassler* 5908 (G); between the rivers Apa and Aquidaban, Paraguay, Jan. 1908–9, *Fiebrig* 4856 (G); in region along the river Apa, Paraguay, Nov. 1901, *Hassler* 7780 (G TYPE, M photograph and fragment).

3. *Dyschoriste Schottiana* (Nees) Kobuski, n. comb.

Hygrophila Schottiana Nees in Mart. Fl. Bras. 9: 22. 1847; Nees in DC. Prodr. 11: 87. 1847.

Dyschoriste crinita (Nees) O. Ktze. Rev. Gen. Pl. 2: 485. 1891; Lindau in Bull. Herb. Boiss. 7: 575. 1899.

Calophanes crinitus Nees in Mart. Fl. Bras. 9: 26. 1847; Nees in DC. Prodr. 11: 107. 1847.

Herbaceous perennial; stem erect, 5–6 dm. high, profusely branched, hirsute; leaves oblong-lanceolate, 4–5 cm. long, 1–1.5 cm. broad, tapering below into a short petiole, entire, glabrous, margin and midrib of under surface scabrous; inflorescence axillary, cymose, many-flowered, subtended by bracts; calyx deeply

mm. longis, apice saepe recurvatis, ciliatis cum duobus generibus multicellularum capillorum, ambis flaccidis subtilibusque; corolla bilabiata, 10–20 mm. longa, rosea vel violacea, lobis obtusis, emarginatis, extus puberulentis, interiore anterioris lobis faucorum pubescente; staminibus parce inclusis, antheris pubescentibus; stylo 10–20 mm. longo, stigmata obliqua, lineari; capsula ignota.—TYPE collected along the river Apa, Paraguay, Nov. 1901, *E. Hassler* 7780 (G).

5-parted, densely hirsute, about 10 mm. long, lobes subulate-setaceous; corolla more or less bilabiate, approximately 18–20 mm. long, pubescent on the external surface; capsule 8–9 mm. long, 4-seeded, glabrous; seeds flattened, suborbicular.

Distribution: southeastern Brazil.

Specimens examined:

Prov. Goyaz, Brazil, Feb. 1841–42, *Gardner 3951* (K TYPE, M photograph).

4. *Dyschoriste angusta* (Gray) Small, Fl. Miami, 168. 1913; Small, Fl. Florida Keys, 135. 1913.

Calophanes angusta Gray, Syn. Fl. N. Am. ed. 2, 2¹: 456. 1886; Small, Fl. Southeastern U.S. ed. 1, 1083. 1903, and ed. 2, 1913.

Calophanes oblongifolia var. *angusta* Gray, Syn. Fl. N. Am. ed. 1, 2¹: 324. 1878, and ed. 2, 1886.

A low-growing perennial, 1–2 dm. high; stem erect or ascending from a creeping base, slightly puberulent, occasionally branching; leaves many, subsessile, linear to linear-lanceolate, 1.5–2 cm. long, lineolate, entire; bracts foliaceous, about one-half as long as the leaves; flowers axillary; calyx 8–9 mm. long, lobes subulate-setaceous, ciliate, distinct to near the base, hardly surpassing the capsule at maturity; corolla blue, purple, or rarely, white, slightly bilabiate, approximately 1 cm. long, tube slightly shorter than the limb and a little amplified at the base; stamens adnate to the base of the limb of the corolla; anthers ovate, filaments widening at the base; capsule glabrous, linear, 4-seeded; seeds somewhat oblique.

Distribution: southern Florida.

Specimens examined:

Palm Beach County: Palm Beach, 26 Dec. 1895–11 Jan. 1896, *Hitchcock 1455* (FM).

Dade County: pine lands, Grossmanns, 24 May, 1904, *Britton 155* (FM); Cocoanut Grove, 26 Dec. 1895, 11 Jan. 1896, *Hitchcock 1456* (FM); Miami, near river, 21 Nov. 1903, *Eaton 385* (FM); in pine lands between Cocoanut Grove and Cutler, 13–23 Nov. 1903, *Small & Carter 776* (FM); cabbage field in pine woods, Grossmanns, 25 Feb. 1905, *Eaton 1247* (G); Biscayne Bay, 1874, *Palmer 347* (G, M, US); Miami, May, 1877, *Garber* (G, M

120923); Biscayne Bay, June, 1880, *Curtiss 1938* (G); Lemon City, 3 March, 1892, *Simpson 528* (G, US); rocky, calcareous land, Miami, 6 April, 1897, *Curtiss 5858* (M, FM, G, US); Black Point Bridge near Cutler, 27 Feb. 1920, *Young 301* (US).

5. *Dyschoriste Purpusii*¹ n. sp.

Pl. 5.

Perennial, erect or ascending from a suffruticose base, branching quite profusely, more or less pubescent, with short, stout, white hairs; leaves sessile, linear to linear-lanceolate, 18–20 mm. long, 1 mm. or less broad, entire, pubescent; flowers slightly pedicellate, subtended by two foliaceous bracts; calyx 5-parted, 9–11 mm. long, lobes unequal, slightly longer than the tube, pubescent, ciliate; corolla 15–17 mm. long, pubescent on the external surface, tube very narrow, not amplified at the base, approximately 7 mm. long, limb 4 mm. long; anthers of the shorter pair of stamens occasionally smaller; style 11–12 mm. long, stigma oblique; capsule linear, glabrous, approximately 10 mm. long; seeds 4, oblique.

Distribution: south Mexico.

Specimens examined:

Puebla: rocky hills, Tehuacan, June, 1905, *Purpus 2362* (M TYPE, US, G, FM); vicinity of San Luis Tultitlanapa, July, 1908, *Purpus 3347* in part (M).

6. *Dyschoriste lavandulacea* (Nees) O. Ktze. Rev. Gen. Pl. 2: 486. 1891.

Calophanes lavandulaceus Nees in Mart. Fl. Bras. 9: 27. 1847; Nees in DC. Prodr. 11: 112. 1847.

Stems erect from a perennial base, 1.5–2 dm. high, sparingly pubescent, quite angular; leaves sessile, linear-lanceolate, 40–50

¹ *Dyschoriste Purpusii* Kob., sp. nov., caulibus perennis, erectis vel ascendentibus a suffruticosa basi, ramis profusis, plus minusve pubescentibus cum brevibus albidis capillibus; foliis sessilibus, linearibus vel linearo-oblancoatis, 18–20 mm. longis, 1 mm. minusve latis, integerrimis, pubescentibus; floribus parum pedicellatis, subtendentibus bracteis; calyce 5-diviso, 9–11 mm. longo, lobis inaequalibus, paulo tubo longioribus, pubescentibus, ciliatis; corolla extus puberula, 15–17 mm. longa, tubo angustissimo, non ampliato ad basem, plus 7 mm. longo, limbis 4 mm. longis; staminibus postero-lateralibus minoribus; capsula lineari, glabra, 10 mm. longa, 4-sperma.—TYPE collected on rocky hills, Tehuacan, June, 1905, *C. A. Purpus 2362* (M).

mm. long, 4–5 mm. wide, tapering to an acute apex, entire, glabrous; inflorescence somewhat glomerulate, several-flowered; bracts minute, 3–5 mm. long, resembling the calyx in texture; calyx 5-lobed, 13–14 mm. long, tube about 5 mm. long, glabrous and covered with cystoliths except for the ciliate, subulate-setaceous lobes; corolla 5-lobed, slightly bilabiate, 20 mm. long, pubescent on the external surface, tube one-half the total length of the corolla, lobes quite truncate; anther cells slightly puberulent; mature capsule not seen.

Distribution: south-central Brazil.

Specimens examined:

In dry fields, near Rio Pardo, Brazil, Sept. 1826, *Riedel 501* (L TYPE, M photograph).

7. *Dyschoriste Greenmanii*¹ n. sp.

Pl. 6.

Plants about 2 dm. high, ascending from a perennial base; stems slender, branched, pubescent at the nodes, otherwise quite glabrous; leaves sessile, linear, 20–25 mm. long, approximately 2 mm. broad, entire, ciliate, sparingly pubescent; flowers few, solitary at the nodes, subtended by 2-foliate bracts; calyx deeply 5-parted, 15 mm. long, flaccid-pubescent on the main nerves; lobes subulate-setaceous, approximately 10 mm. long; corolla pubescent on the external surface, 17 mm. long, scarcely exceeding the calyx in length, tube 6.5–7 mm. long, throat more or less equalling the tube in length; style 12 mm. long, pubescent, stigma oblique; capsule linear, glabrous, 7–8 mm. long, 4-seeded.

Distribution: northeastern Mexico.

Specimens examined:

Vicinity of Victoria, Tamaulipas, alt. 320 m., 1 May–13 June, 1907, *Palmer 492* (US TYPE, M photograph and fragment).

¹ *Dyschoriste Greenmanii* Kob., sp. nov., planta prope 2 dm. alta, ascendens a perenne basi; caulibus gracilibus, ramosis, pubescentibus ad nodos, aliter glabris; foliis linearibus, sessilibus, 20–25 mm. longis, 2 mm. latis, integerrimis, ciliatis, parce pubescentibus; floribus paucis, solitariis ad nodos, subtendentibus 2-foliaceis bracteis; calyce profunde 5-diviso, 15 mm. longo, flaccido-pubescente nervis, lobis subulato-setaceis, prope 10 mm. longis; corolla 17 mm. longa, paulo calyce longiore, tubo 6.5–7 mm. longo, fauce plus minusve aequante tubum; stylo 12 mm. longo, pubescente, stigmata obliqua; capsula lineari, glabra, 7–8 mm. longa, 4-sperma.—TYPE collected in the vicinity of Victoria, Tamaulipas, Mexico, 1 May–13 June, 1907, *E. Palmer 492* (US).

8. *Dyschoriste Niederleinii* Lindau in Engl. Bot. Jahrb. 19 (Beibl. 48): 15. 1894.

Low-growing perennial; stems ascending, about 1 dm. high, branches tetragonal, minutely puberulent; leaves linear, approximately 30 mm. long, 5 mm. broad, somewhat obtuse at the apex, entire, glabrous, sparsely pilose at the base, petiole 2 mm. long; flowers single, axillary, subtended by small bracts; calyx 5-parted, puberulent, 11 mm. long, tube and calyx lobes of equal length; corolla puberulent on the external surface, 15 mm. long, ventricose; style 6 mm. long, filiform, pubescent; mature capsule unknown.

Distribution: Argentina.

Specimens examined:

"Ad Primer Misionero de Hernandez," *Puck and Fernandez* (*Niederlein 42*), Argentina, Feb. 1884, (B TYPE, M photograph).

9. *Dyschoriste Schiedeana* (Nees) O. Ktze. Rev. Gen. Pl. 2: 486. 1891.

Calophanes Schideanus Nees in DC. Prodr. 11: 111. 1847; Mueller in Walpers, Ann. 5: 647. 1858, including var. *multiflorus*; Hemsl. in Biol. Cent.-Am. Bot. 2: 502. 1882.

Perennial, ascending or erect from a suffruticose base, 3–6 dm. high; stems somewhat angular, hirsute, branched near the base; leaves usually linear-lanceolate, lower cauline leaves occasionally obovate, 20–25 mm. long, 3–5 mm. broad, acute at the apex, narrowed at the base into a very short petiole, entire, hirsute on both surfaces; flowers axillary, usually two in an axil, subtended by bracts which equal or nearly equal the calyx in length; calyx 5-parted, 11–12 mm. long, lobes 7 mm. long, subulate-setaceous, hirsute; corolla 14–15 mm. long, pubescent on external surface, tube 4 mm. long; mature capsule 7–8 mm. long, linear, glabrous, acute at apex, 4-seeded; seeds typical.

Distribution: eastern Mexico.

Specimens examined:

Nuevo Leon: near Monterey, alt. 550 m., Aug. 1911, *Arséne 6411* (US).

Vera Cruz: in fields near Jalapa, date lacking, *Schiede 122* (M photograph of type, B TYPE); Mirador, date lacking, *Sartorius* (US 55268).

10. *Dyschoriste Rosei*¹ n. sp.

Pl. 7, fig. 1.

Low-growing perennial; stem pubescent, branched, ascending or erect, 12–15 cm. high; leaves sessile, linear, entire, glabrous, 18–25 mm. long, 2 mm. broad; flowers few, solitary at the nodes, usually near the apex of the stem, slightly pedicellate, subtended by 2-foliateous bracts; calyx 5-parted, glabrous except for the ciliate margin of the unequal, subulate-setaceous lobes, shorter posterior lobes 8–9 mm. long, anterior lobes 11–12 mm. long; corolla externally pubescent, 25 mm. long, tube 10 mm. long, diverging abruptly into a broadly amplified throat which is approximately equal the tube in length; stamens occasionally incompletely didynamous; ovary 2-celled, each cell containing 2 ovules, style 17–18 mm. long, stigma oblique, 2 mm. long; mature capsule not seen.

Distribution: western Mexico.

Specimens examined:

Durango: without definite locality, 13 Aug. 1897, *Rose 2259* (US TYPE, M fragment and photograph).

Jalisco: on road between Mesquite and Monte Escolebo, 26 Aug. 1897, *Rose 3581* (US).

11. *Dyschoriste jaliscensis*² n. sp.

Pl. 8.

Stems several, 3–4 dm. high, erect from a ligneous, perennial base, branching, pubescent; leaves linear to linear-oblongate, 2.5–3.5 cm. long, 2 mm. or less broad, narrowed at the base,

¹ *Dyschoriste Rosei* Kob., sp. nov., humilis perennis; caule pubescente, ramis ascenduntibus vel erectis, 12–15 cm. altis; foliis linearibus, sessilibus, 18–25 mm. longis, 2 mm. latis, integerrimis, glabris; floribus paucis, solitariis ad nodos, fere prope apicem, subpedicellatis, subtendentibus bracteis; calyce 5-diviso, glabro, lobis inaequalibus, subulato-setaceis, posterioribus lobis 8–9 mm. longis, anterioribus lobis 11–12 mm. longis; corolla extus puberula, 25 mm. longa, tubo 10 mm. longo, divergente subito in late ampliato fauce; staminibus didynamis, subinde imperfectis; ovario biloculo, stylo 17–18 mm. longo; stigma obliqua, 2 mm. longa; capsula ignota.—TYPE collected in the state of Durango, 13 Aug. 1897, *Rose 2259* (US).

² *Dyschoriste jaliscensis* Kob., sp. nov., planta 3–4 dm. alta; caulibus pluribus, erectis a lignoso basi, ramis pubescentibus; foliis linearibus, linearo-oblongatis, 2.5–3.5 cm. longis, 2 mm. minusve latis, basi attenuatis, integerrimis, pubescentibus; floribus maioribus, bracteis foliaceis, 10 mm. longis; calyce 17–18 mm. longo, pubescente, lobis 11–12 mm. longis, subulato-setaceis, ciliatis; corolla prope 30 mm. longa, tubo 12–13 mm. longo, paucè fauce longiore; antheris 2 mm. longis, basi bicalcaratis; stylo 20–21 mm. longo, stigmata obliqua, capsula ignota.—TYPE collected on rocky hills near Guadalajara, Jalisco, 27 June, 1893, *Pringle 5481* (G).

entire, pubescent; flowers comparatively large, subtended by 2-foliate bracts which are about 10 mm. in length; calyx 17–18 mm. long, pubescent, lobes 11–12 mm. long, subulate, setaceous, ciliate; corolla approximately 30 mm. long, tube 12–13 mm. long, slightly longer than the throat; anthers about 2 mm. long; style 20–21 mm. long, stigma oblique; mature capsule not seen.

Distribution: western Mexico.

Specimens examined:

Jalisco: rocky hills near Guadalajara, 27 June, 1893, *Pringle* 5481 (US, G TYPE, M photograph and fragment).

12. *Dyschoriste angustifolia* (Hemsl.) O. Ktze. Rev. Gen. Pl. 2: 485. 1891.

Calophanes angustifolius Hemsl. in Biol. Cent.-Am. Bot. 2: 502. 1882.

Stem erect, strict, 4–5 dm. tall, more or less villous-hirsute; leaves subsessile, linear-lanceolate, 1.5–2.5 cm. long, 3–5 mm. broad, acute at the apex, attenuate at the base, entire, scabrous; flowers axillary, disposed in dense shortly pedunculate cymes in the axils of the upper leaves, subtended by narrow bracts which almost equal the calyx in length; calyx deeply 5-parted, 15 mm. long, scabrous, lobes subulate-setaceous, nearly equalling the tube of the corolla, ciliate; corolla bilabiate, puberulent on the external surface, approximately 25 mm. long; anther cells shortly mucronate at the base; ovary 2-celled, cells 2-ovulate, glabrous, stigma linear, oblique; mature capsule not seen.

Distribution: southern Mexico.

Specimens examined:

Oaxaca: without definite locality, coll. of 1842, *Ghiesbreght* (K, M photograph).

13. *Dyschoriste linearis* (Torr. & Gray) O. Ktze. Rev. Gen. Pl. 2: 486. 1891; Lindau in Engl. & Prantl, Nat. Pflanzenfam. 4^{3b}: 302. 1895; Lindau in Bull. Herb. Boiss. II. 6: 844. 1906.

Dipteracanthus linearis Torr. & Gray, Bost. Jour. Nat. Hist. 5: 50. 1845 (Pl. Lindh. 1: 50).

Calophanes linearis Gray, Syn. Fl. N. Am. 2¹: 324. 1878, and

ed. 2, 1886; Hemsl. in Biol. Cent.-Am. Bot. 2: 503. 1882; Small, Fl. Southeastern U. S. 1033. 1903, and ed. 2, 1913.

Calophanes oblongifolius var. *texensis* Nees in DC. Prodr. 11: 108. 1847; Torr. in Emory's Rept. U.S. & Mex. Bound. Surv. 2 (Bot.): 122. 1859.

Calophanes ovatus Nees in DC. Prodr. 11: 108. 1847, not *Ruellia ovata* Cav.

Ruellia ovata Benth. Fl. Hartweg. 89. 1842, not Cav. i.e., as to plant of Drummond from Texas.

Stem 18–42 cm. high, erect and strict, branched and diffuse, hirsute with both rigid and short hairs, sometimes sparsely pubescent or nearly glabrous, not cinereous; leaves linear-oblan-ceolate to oblong-spathulate, 1.8–6.5 cm. long, entire, lineolate, rather rigid, pubescent on midrib and veins, margin ciliate; bracts foliaceous, frequently in short-leaved specimens equalling the length of the leaf; calyx 5-cleft, densely lineolate, giving the appearance of appressed hairs, lobes 9–13 mm. long, subulate-setaceous, more or less hispid, ciliate, calyx tube 4.5–6 mm. long, in most cases one-half the length of the lobes; corolla somewhat bilabiate, 26–27 mm. long, pubescent on external surface, tube 5–7 mm. long and slightly shorter than the abruptly amplified limb; anther cells oblong; capsule 4-seeded; seeds flat.

Distribution: Texas to New Mexico and northern Mexico.

Specimens examined:

Texas: rocky prairies, 12 July, 1903, *Reverchon* (M 120836); western Texas, 1890, *Nealley* (Ch 254803); 1846, *Lindheimer* 504 (US); *Drummond* 2 no. 178 (G TYPE); *Drummond* 256 (G); dry prairies, Bay City, Matagorda Co., 6 May, 1916, *Palmer* 9667 (M); prairies, Ganado, Jackson Co., 20 March, 1916, *Curtiss* 9216 (M); dry open ground, Vanderbilt, Jackson Co., 10 May, 1916, *Palmer* 9708 (M); Calhoun Co., 10 Aug. 1920, *Drushel* 4136 (M); dry rocky prairies near Dallas, Dallas Co., June–July, *Curtiss* 1941 (FM, M); dry rocky prairies, Dallas, Dallas Co., May–June, 1879, *Reverchon* (FM 88468); dry rocky prairies near Dallas, Dallas Co., date lacking, *Reverchon* 1941 (G, M, US); rocky limestone prairies, Dallas Co., 15 May, *Reverchon* 722 (M, US); Dallas Co., 23 May, 1903, *Bebb* 1343 (FM); rocky prairies, Dallas Co., 18 May, 1900, *Reverchon* 2114 (M); field and gardens, Fort Worth,

Tarrant Co., 8 June, 1909, *Ruth 104* (US); along roadsides near Fort Worth, Tarrant Co., 5 July, 1909, *Ruth 30* (FM); dry grounds near Fort Worth, Tarrant Co., 1 June, 1910, *Ruth 81* (FM); Austin, Travis Co., 25 June, 1920, *Tharp 733* (US); Austin, Travis Co., 1897, *Buckley* (M 120803); dry hills, Austin, Travis Co., 13 May, 1872, *Hall 431* (G); dry prairies, Austin, Travis Co., 16 May, 1872, *Hall 428* (US); along Corpus Christi Bay, Nueces Co., alt. sea level, 9-12 April, 1894, *Heller 1529* (G, M US, FM); dry open ground, Strawn, Palo Pinto Co., 27 June, 1918, *Palmer 14252a* (M); Dublin, Erath Co., 1893, *Maxwell 49* (Ch); Round Top Mt., Comanche Co., 9 May, 1900, *Eggert* (M, 120809); Gillespie Co., date lacking, *Jermy 472* (M); rich hillside, Boerne, Kendall Co., 19 May, 1916, *Palmer 9811* (M); in dried river beds of mountain rivers north of Braunfels, Comal Co., 1846, *Lindheimer 325* (M); in pastures, Bracken, Comal Co., 3 Aug. 1903, *Groth 230* (G); humid prairie and along margin of shrubs near New Braunfels, Comal Co., May, 1848, *Lindheimer 677* (G, M, FM, US); in grass and on black prairie loam, New Braunfels, Comal Co., May, 1846, *Lindheimer 111* (G, M); Comanche Springs, New Braunfels, Comal Co., May, 1851, *Lindheimer 1063* (M, G, FM, US); New Braunfels, Comal Co., May, 1851, *Lindheimer 552* (M); in open pastures, 5 miles south of San Antonio, Bexar Co., 14 May, 1920, *Schultz 146* (US); San Antonio, Bexar Co., 1918, *Slater* (US 891769); San Antonio, Bexar Co., 1884, *Havard* (Ch 252081); Bexar Co., date lacking, *Jermy 62* (M, US); San Antonio, date lacking, *Jermy 249* (G); San Antonio, Bexar Co., 27 April, 1911, *Mr. & Mrs. Clemens 1069* (M); Bexar Co., date lacking, *Jermy 31* (US); San Diego, Duval Co., 1885, *Croft 6465* (M); San Diego, Duval Co., July, 1885, *Croft 6660* (M); dry open ground, Baird, Callahan Co., 26 May, 1918, *Palmer 13698* (M); Abilene, Taylor Co., 22 May, 1902, *Tracy 8079* (G, M, FM, US); prairie north of Abilene, Taylor Co., 7 June, 1900, *Eggert* (M 120800); calcareous banks, Menard Co., 11 May, 1917, *Palmer 11871* (M); dry alluvial soil along creek, Lacey's ranch, Kerr Co., 10 June, 1917, *Palmer 12229* (M); rocky ground, Sweetwater, Nolan Co., 27 May, 1918, *Palmer 13758* (M); Knickerbocker ranch, Dove Creek, Tom Green Co., May, 1880, *Tweedy 180* (US); Fort Clark, Kinney Co., 10 May, 1893, *Mearns 1432*

(US); Devils River, Valverde Co., May, 1913, *Orcutt 6230* (M); prairie north of Stanton, Martin Co., 13 June, 1900, *Eggert* (M 120810); western Texas to El Paso, New Mexico, El Paso Co., May–Oct. 1849, *Wright 432* (G, FM, US).

New Mexico: Slaughter Canyon, Guadalupe Mts., 12–20 Aug. 1924, *Standley 40624* (US).

Mexico: Sierra Madre, 45 miles south of Saltillo on border of states of Coahuila and Nuevo Leon, July, 1880, *Palmer 2033* (G); roadside, Piedras Nigras, Coahuila, May, 1883, *Havard* (Ch 267840, US 147426); near Huasemote, Durango, 15 Aug. 1897, *Rose 3495* (US).

14. *Dyschoriste bilabiata* (Seemann) O. Ktze. Rev. Gen. Pl. 2: 486. 1891; Lindau in Bull. Herb. Boiss. 7: 575. 1899. Pl. 9.

Calophanes bilabiatus Seem. Voy. H. M. S. Herald, 324. pl. 65. 1852–57; Hemsl. in Biol. Cent.-Am. Bot. 2: 502. 1882.

Stems 6–7 dm. high, erect from a perennial base, branching, pubescent; leaves ovate-oblong, 4–5 cm. long, 1.5–2 cm. broad, acute at the apex, narrowed at the base into a petiole, repand-denticulate, densely pubescent on both surfaces; flowers axillary, cymose, cymes pedunculate, 3–5-flowered, subtended by subulate bracts; calyx 5-lobed, 12 mm. long, tube 5 mm. long, pubescent, lobes subulate-setaceous, ciliate; corolla subbilabiate, pale blue, 14 mm. long, tube 5–6 mm. long, subventricose, pubescent on the external surface; filaments hairy; ovary glabrous, style filiform, stigma linear, oblique; mature capsule linear, glabrous, 4-seeded.

Distribution: western Mexico.

Specimens examined:

Cerro de Pinal, Sinaloa, Dec. 1848, *Seemann 1513* (K TYPE, M photograph only).

15. *Dyschoriste decumbens* (Gray) O. Ktze. Rev. Gen. Pl. 2: 486. 1891; Lindau in Engl. & Prantl, Nat. Pflanzenfam. 4^{3b}: 302. 1895.

Calophanes decumbens Gray, Syn. Fl. N. Am. ed. 1, 2¹: 325. 1878, and ed. 2, 1886; Hemsl. in Biol. Cent.-Am. Bot. 2: 502. 1882.

Calophanes oblongifolius Torr. Bot. Mex. Bound. Surv. 122. 1855, not Don.

Cinereous-puberulent throughout; stems mostly spreading on the ground from a ligneous base, occasionally erect, branched; leaves spatulate to oblanceolate, 2–3 cm. long, 0.5–1.1 cm. broad, entire, apex usually obtuse, sometimes slightly mucronate, base attenuated, often having the appearance of a petiole; flowers few, in foliose, bracteate clusters; calyx 15–20 mm. long, at maturity exceeding the capsule by as much as 10 mm., 5-cleft, tube 5–7 mm. long, lobes subulate-setaceous, hardly twice the length of the tube; corolla purple, 18–20 mm. long, tube a little longer than the throat, slightly amplified at the base; anther cells oblong, filaments united at the base of the corolla-throat; seeds 4, sub-orbicular and flattened.

Distribution: dry soil, western Texas to Arizona, and the plateau region of northern Mexico.

Specimens examined:

Texas: Chenates region of western Texas, 1889, *Nealley* 580 (357) (US); infrequent on slopes between Marfa and Alpine, 15 April, 1919, *Hanson* 638 (US).

New Mexico: Valley of the Rio Grande, 1851, *Wright* 1462, 1463 (M).

Arizona: Sonoito Valley, Santa Cruz Co., alt. 1833 m., Aug. 1874, *Rothrock* 637 (US); Fort Huachuca, 1890, *Patzky* (US 721394); Fort Huachuca, Cochise Co., May, 1892, *Wilcox* (US 55273, M 120796); roadway, Chiricahua Mts., Cochise Co., alt. 1400 m., 9 Oct. 1907, *Blumer* 2223 (FM); Fort Huachuca, Cochise Co., 1894, *Wilcox* 150 (US); foothills of Santa Rita Mts., near Greaterville, Pima Co., alt. 1666 m., 16 Sept. 1916, *Shreve* 4978 (US); plains about Huachuca Mts., Aug. 1882, *Lemmon* (US 55278); locality lacking, 1875, *Rothrock* (US 55277); Fort Huachuca, Cochise Co., 26 April–21 May, 1890, *Palmer* 472 (US).

Mexico: Sierra Mojado Mts., Coahuila, 19 April, 1892, *Jones* 374 (US, M); near the border of Coahuila and Nuevo Leon, Feb.–Oct. 1880, *Palmer* 1009 (US); Saltillo, Coahuila, alt. 1600 m., 1911, *Arséne* 6472 (US); Saltillo, Coahuila, July, 1880, *Palmer* 2032 (G); Saltillo, Coahuila, May, 1898, *Palmer* 125 (US, M); Lerios, 15 leagues east of Saltillo near the border of Coahuila and

Nuevo Leon, alt. 3000 m., 10–13 July, 1880, *Palmer 1010 (15453)* (US, M); on road near Colatlan, Zacatecas, 31 Aug. 1897, *Rose 3615* (US); exact locality lacking, San Luis Potosi, 1897, *Schaffner 354 (647)* (US); San Luis Potosi, alt. 2000–2500 m., 1878, *Parry & Palmer 699* (FM, M, G, US); near Queretaro, 20–23 Aug. 1909, *Rose & Rose 11148* (US); San Andres Mts., Chihuahua, 22 Aug. 1900, *Trelease 352* (M); hills near Chihuahua, Chihuahua, 30 Sept. 1886, *Palmer 1075* (M); vicinity of Chihuahua, Chihuahua, alt. 1300 m., 1–21 May, 1908, *Palmer 208* (US); rocky hills near Chihuahua, Chihuahua, May, 1885, *Pringle 66* (US, G, FM); Cosihuiriachic, west of the city of Chihuahua, Chihuahua, 20 Sept. 1846, *Wislizenus 185* (M); City of Durango, Durango, 1 Aug. 1898, *Nelson 4597* (US); in the vicinity of Durango, Durango, April–Nov. 1896, *Palmer 309* (FM, US, M, G); *Palmer 930* (US, M); *Palmer 276* (US, G); Sonora, 8 Sept. 1851, *Thurber 974* (G).

16. *Dyschoriste crenulata*¹ n. sp.

Pl, 7, fig. 2.

Stems several, 1–2 dm. high, erect or ascending from a perennial, ligneous base, pubescent; leaves more or less spatulate to obovate, 2–3 cm. long, 0.6–1 cm. broad, acute to obtuse at the apex, attenuate at the base, densely cinereous pubescent, margin crenulate; calyx 5-parted, 17–18 mm. long, nearly equalling the length of the corolla, tube and lobes of nearly equal length, lobes subulate-setaceous, cinereous, ciliate; corolla 18–19 mm. long, pubescent on the external surface, throat slightly longer than the tube; anthers occasionally unequally didynamous, style 11–12 mm. long, stigma oblique; mature capsule not seen.

Distribution: south Texas, south into Tamaulipas.

Specimens examined:

¹ *Dyschoriste crenulata* Kob., sp. nov., planta 1–2 dm. alta; caulibus pluribus, erectis vel ascendentibus a perenne lignoso basi, pubescentibus; foliis subsessilibus, plus minusve spatulatis vel plerumque obovatis, 2–3 cm. longis, 0.6–1 cm. latis, apice acutis vel obtusis, crenulatis, basi attenuatis, cinereo-pubescentibus; calyce 5-diviso, 17–18 mm. longo, prope aequante corollam, tubo lobes aequante, lobis subulato-setaceis, cinereis, ciliatis; corolla 18–19 mm. longa, extus puberula, fauce tubo paulo longiore; staminibus didynamis, subinde imperfectis; stylo pubescente, 11–12 mm. longo, stigmata obliqua; capsula ignota.—Type collected on road from "San Fernando to Jimeney," state of Tamaulipas, Mexico, 26–27 Feb., 1902, *E. W. Nelson 6604* (G).

Texas: Brazos Santiago, 1899, *Nealley 124* (357) (US).

Mexico: "San Fernando to Jimeney," Tamaulipas, 26-27 Feb. 1902, *Nelson 6604* (G TYPE, US isotype, M photograph and fragment).

17. *Dyschoriste capitata* (Oerst.) O. Ktze. Rev. Gen. Pl. 2: 486. 1891.

Calophanes capitatus Oerst. in Vidensk. Meddel. 121. 1854; Mueller in Walpers, Ann. 5: 647. 1858; Hemsl. in Biol. Cent.-Am. Bot. 2: 502. 1882.

Stems several, frequently branching and ascending from a ligneous base, 4 dm. high, subtetragonal, often geniculate, pubescence becoming more pronounced and flaccid near the apex; leaves obovate, 15-27 mm. long, 8-12 mm. broad, obtuse at the apex, attenuate into a petiole varying from a sessile condition to 5 mm. in length, entire, ciliate, upper surface hirsute, especially on basal portion of midrib and petiole, sparingly so along midrib and veins of lower surface; flowers congested in heads at the apex of the stem and branches, subtended by oblanceolate bracts, the basal portion invested with long whitish hairs; calyx 9-10 mm. long, 5-lobed, joined for one-third its total length, possessing the same pubescence as the bracts, together giving a distinctly whitish appearance to the inflorescence, lobes subulate-setaceous; corolla 15-16 mm. long, puberulent on the external surface; filaments terminated by an emarginate, muticous prolongation at the apex; staminodium sometimes present; ovary glabrous, stigma linear, oblique; mature capsule glabrous, 8-9 mm. long, 4-seeded.

Distribution: mountains of southern Mexico.

Specimens examined:

Prov. of San Luis Potosi, 1851, *Oersted 808*¹ (C); Sierra de San Felipe, Oaxaca, alt. 2000 m., 15 June, 1897, *Pringle 6718* (FM, G, M, US); Valley of Oaxaca, alt. 1550 m., 8 June, 1897, *Conzatti & Gonzales 282* (G).

18. *Dyschoriste Pringlei* Greenm. in Proc. Am. Acad. 40: 32. 1905.

¹ This citation refers to a photograph of the only Oersted specimen of *D. capitata* found in the Copenhagen Herbarium.

Stems several, 1–2 dm. in length, erect or ascending from a ligneous perennial base, densely hirsute-pubescent or subtomentose; leaves lance-elliptic to slightly obovate, 1.5–4 cm. long, 0.5–1.6 cm. broad, obtuse or acute, entire, narrowed below to a subpetiolate base, sparingly hirsute-pubescent on both surfaces; flowers crowded in the axils of the upper leaves, forming a subcapitate, leafy inflorescence; calyx 13–14 mm. long, densely pubescent with white flaccid hirsute hairs, divided to somewhat below the middle, divisions lance-attenuate; corolla tubular-campanulate, 3–4 cm. long, externally pubescent, more or less purplish-maculate, at least in the dried state; stamens adnate to the corolla for about one-half its length, anthers rather conspicuously calcarate; ovary glabrous, style pubescent; mature capsule not seen.

Distribution: southwestern Mexico.

Specimens examined:

Barranca of Rio Blanco near Guadalajara, Jalisco, alt. 1500 m., 22 July, 1902, *Pringle 11313* (G, FM, US); deep canyons near Guadalajara, Jalisco, 1 July, 1889, *Pringle 2907* (G TYPE, FM, M photograph).

19. *Dyschoriste oaxacensis*¹ n. sp.

Pl. 10.

Stems several, procumbent, ascending from a woody base, 1–2 dm. high, pubescent with lineolations showing through pubescence; leaves sessile, oblanceolate, occasionally somewhat spatulate, 15–20 mm. long, 3–5 mm. broad, obtuse at the apex, ciliate, sparsely pubescent or glabrous, appearing scabrous because of the irregular scattering of cystoliths; flowers axillary, congested at the apex of stem and branches, producing a capitate-like inflorescence, subtended by oblanceolate bracts, approximately 10

¹*Dyschoriste oaxacensis* Kob., sp. nov., caulibus pluribus, procumbentibus, lineolatis, 1–2 dm. altis; foliis sessilibus, oblanceolatis, rare subspathulatis, 15–20 mm. longis, 3–5 mm. latis, ciliatis, pauce pubescentibus; floribus axillaribus, in apice caulis ramorumque capitatum congestis; bracteis plus minusve 10 mm. longis; calyce 12 mm. longo, glabro, cystolithero, lobis subulatis, setaceis, ciliatis, 7 mm. longis; corolla subbilabiata, extus puberula, 20 mm. longa, tubo 7 mm. longo; antheris basi bicalcaratis; stylo lineari, pubescente, 13–14 mm. longo, stigmata lineari, obliqua; capsula 10–11 mm. longa, glabra, 4-sperma; seminibus subrotundatis, planis, humectatis mucilaginosi.—TYPE collected on calcareous hills, Las Sedas, Oaxaca, Mexico, 9 July, 1891, *Pringle 6712* (G).

mm. long, calyx about 12 mm. long, except for the lobes glabrous and covered with cystoliths, lobes subulate-setaceous, ciliate, 7 mm. long; corolla externally puberulent, 20 mm. long, tube 7 mm. long, somewhat bilabiate; stamens adnate below the middle of the corolla limb; ovary glabrous, style 13–14 mm. long, stigma linear, oblique; mature capsule 10–11 mm. long, glabrous, 4-seeded; seeds oblique, somewhat rounded, flattened.

Distribution: southern Mexico.

Specimens examined:

Oaxaca: calcareous hills, Las Sedas, alt. 2000 m., 19 July, 1891, *Pringle 6712* (M TYPE, G, FM, US); Las Sedas, alt. 2000 m., 2 June, 1907, *L. C. Smith 419* (G); Nochixtlan, alt. 2000 m., 19 June, 1907, *Conzatti 1858* (FM).

20. *Dyschoriste pinetorum*¹ n. sp.

Pl. 11.

Stems erect or ascending from a woody, perennial base, branches often arising from nodes of prostrate or erect growth of previous year, subquadrangular, 20–30 cm. high, nodes frequently 5–6 cm. distant, pubescent especially at the apex; leaves obovate-elliptic, 25–35 mm. long, 10–18 mm. broad, acute to subrotund at the apex, subsessile, attenuate at the base into a very short petiole, entire, ciliate, hirsute on both surfaces, the pubescence confined to midrib and veins on the under surface, veins conspicuous; flowers disposed in heads at the tips of the stems and branches and subtended by oblanceolate bracts; calyx 11–13 mm. long, divided two-thirds the distance to the base into five subulate-setaceous, ciliate lobes, pubescence similar to that of the bracts, together giving a canescent appearance to the leafy capitate inflorescence; corolla puberulent on the external surface,

¹ *Dyschoriste pinetorum* Kob., sp. nov., caulibus erectis vel ascendentibus a lignoso perenne basi, subquadrangularis, 20–30 cm. altis, nodis saepe 5–6 cm. diversis, pubescentibus praesertim apice; ramis saepe crescentibus ex nodis prostratorum vel erectorum caulorum antecedentis anni; foliis subsessilibus, obovato-ellipticis, 25–35 mm. longis, 10–18 mm. latis, apice acutis vel subrotundis, basi in petiolum brevissimum attenuatis, integris, ciliatis, utrinque hirsutis, praesertim ad costas nervosque subtorum; floribus apice caulis ramorumque capitatum congestis; calyce 11–13 mm. longo, diviso ad $\frac{2}{3}$ a basi in quinque subulatis, setaceis, ciliatis lobis, pubescentibus, canescentibus; corolla extus puberula, 20–21 mm. longa, tubo limbum aequante; stylo hirsuta, stigmata lineari, obliqua; capsula ignota.—TYPE collected in sandy fields under pines, near Patzcuaro, Michoacan, 31 July, 1892, *C. G. Pringle 4134* (G).

20–21 mm. long, tube and throat of approximately equal length; stamens adnate to about the middle of the corolla-tube; style hirsute, stigma linear, oblique; mature capsule not seen.

Distribution: southern Mexico.

Specimens examined:

Michoacan: sandy fields under pines near Patzcuaro, 31 July, 1892, *Pringle 4134* (G TYPE, isotypes in M, Ch, FM, US).

21. *Dyschoriste sagittata*¹ n. sp.

Pl. 12.

Low-growing perennial; stems ascending 1–2 dm. high from a ligneous base, glabrous or nearly so, densely covered with cystoliths, quadrangular, somewhat winged, branched; leaves sessile, elliptic-obovate, 15–25 mm. long, 9–12 mm. broad, usually obtuse at the apex and base, glabrous, entire; bracts slender, lanceolate, glabrous, 8 mm. long, bracteoles minute, acuminate, 2–3 mm. long; calyx 8–10 mm. long, minutely pubescent on the nerves, lobes about 5 mm. long, subulate-setaceous, sparsely and minutely ciliate; corolla pubescent on the external surface, barely exceeding the calyx in length, ventricose, slightly bilabiate, lobes rounded, margins crenate; stamens small, filaments adnate to a little below the middle of the corolla-throat, anther cells converging towards the acute apex, slightly diverging at the calcarate base, giving a sagittate appearance, approximately 0.5 mm. long; style 4–5 mm. long, minutely pubescent or glabrous, stigma lobed; mature capsule not seen.

Distribution: Paraguay.

Specimens examined:

Paraguay: in region along the Alta Parana River, 1909–10, *Fiebrig 6383* (G TYPE, M fragment and photograph).

¹ *Dyschoriste sagittata* Kob. sp. nov., humilis perennis; caulibus ascendentibus, 1–2 dm. altis a lignoso basi, glabris, cystolitheris, quadrangularis, alatis, ramosis; foliis sessilibus, elliptico-obovatis, 15–25 mm. longis, 9–12 mm. latis, glabris, apice basique obtusis; bracteis angustis, lanceolatis, glabris, 8 mm. longis, bracteolis minutis, acuminatis, 2–3 mm. longis; calyce 8–10 mm. longo, puberulente in nervis loborum calycum, lobis prope 5 mm. longis, subulatis-setaceis, parce et minute ciliatis; corolla extus puberula, minor calyce paululo longiore, ventricosa, subbilabata, lobis rotundis, marginibus crenatis; antheris sagittatis, basi divergentibus et bicalcaratis, apice acutis; stylo 4–5 mm. longo, parce pubescente vel glabro, stigmata trilobata, medio lobo longissimo, circiter 0.5 mm. longo; capsula ignota.—TYPE collected in the region along the Alta Parana River, Paraguay, coll. of 1909–10, *Fiebrig 6383* (G).

22. Dyschoriste Serpyllum (Nees) O. Ktze. Rev. Gen. Pl. 2: 486. 1891.

Calophanes Serpyllum Nees in Mart. Fl. Bras. 9: 26. 1847; Nees in DC. Prodr. 11: 110. 1847.

Stems 1 dm. or less high, erect from a suffruticose base, pubescent; lower leaves ovate, upper leaves ovate-lanceolate, narrowed at the base, 10–12 mm. long, 3–5 mm. wide, entire, glabrous, subsessile; flowers few, usually toward the apex of the stem, subtended by leafy, glabrous bracts; calyx unequally 5-parted, submembranaceous, sparsely pubescent, 12 mm. long, lobes greatly attenuated, approximately twice as long as the tube, ciliated; corolla 12–13 mm. long, pubescent on the external surface, tube very short, not more than 3–4 mm. long, ampliation into throat apparently beginning at the base of the tube; stamens abruptly yet obtusely appended at the apex, bicalcarate at the base; ovary 2-celled, each cell possessing 2 ovules, style sparsely pubescent, filiform, stigma oblique; mature capsule not seen.

Distribution: southeastern Brazil.

Specimens examined:

Brazil: in dry fields near Rio Pardo, Sept. 1826, *Riedel* 45 (L TYPE, M fragment and photograph).

23. Dyschoriste Lloydii¹ n. sp.

Pl. 13.

Stems branched near the base, erect, pubescent, 1–1.5 dm. high; leaves sessile, oblong-ob lanceolate, 18–20 mm. long, 3–4 mm. broad, sparingly hirsute-pubescent on both surfaces, often confined to the midrib and veins, entire; bracts foliaceous, nearly equalling the calyx in length; calyx 10–10.5 mm. long, tube 4–5 mm. long, sparingly pubescent, lobes ciliate, subulate-setaceous; corolla 14 mm. long, tube 5 mm. long, approximately equalling the throat in length; ovary and stamens typical of the genus;

¹ *Dyschoriste Lloydii* Kob. sp. nov., caulibus erectis vel ascendentibus, pubescentibus, 1–1.5 dm. altis; foliis sessilibus, oblongo-ob lanceolatis, 18–20 mm. longis, 3–4 mm. latis, integris, utrinque parce hirsuto-pubescentibus, praesertim ad costas nervosque; bracteis foliaceis; calyce prope 10–10.5 mm. longo, tubo 4–5 mm. longo, parum pubescente, lobis ciliatis, subulato-setaceis; corolla 14 mm. longa, tubo 5 mm. longo, prope aequante ampliatus faucem; capsula lineari, glabra, 7–8 mm. longa, 4-sperma; seminibus typicibus.—TYPE collected near Hacienda de Cedros, state of Zacatecas, Mexico, 1908, *F. E. Lloyd* 199 (US).

capsule linear, glabrous, 7-8 mm. long, 4-seeded; seeds flattened, suborbicular, oblique.

Distribution: central Mexico.

Specimens examined:

Zacatecas: flats, Hacienda de Cedros, summer 1908, *Lloyd 199* (US TYPE).

24. *Dyschoriste microphylla* (Cav.) O. Ktze. in Rev. Gen. Pl. 2: 486. 1891. Pl. 14.

Calophanes microphyllus (Cav.) Nees in DC. Prodr. 11: 113. 1847; Hemsl. in Biol. Cent.-Am. Bot. 2: 502. 1882.

Ruellia microphylla Cav. Ic. 6: 63, pl. 586, f. 2. 1801; Spreng. Syst. 2: 821. 1825.

Dyschoriste Jasminum O. Ktze. in Rev. Gen. Pl. 2: 486. 1891.

Calophanes Jasminum-mexicanum Nees in DC. Prodr. 11: 110-111. 1847; Hemsl. in Biol. Cent.-Am. Bot. 2: 502. 1882.

Stem rising or ascending from a perennial base, pubescent; leaves distinctly ovate, obtuse-rotund at the apex, attenuate at the base into a petiole, 1.5-3 cm. long (including petiole), 0.9-1.2 cm. broad, glabrous except for slight pubescence on midrib and margin, entire; inflorescence terminal or on rather short lateral branches, subtended by foliaceous bracts; calyx 5-parted, 12-13 mm. long, somewhat pubescent, especially on the lobes, lobes subulate-setaceous, one-half the total length of the calyx, ciliate; corolla puberulent on the external surface, 13-14 mm. long, tube 8-9 mm. long, ampliating abruptly into the short throat, lobes rounded; stamens adnate below the center of the corolla throat, filaments broadening toward the base; style filiform, pubescent, stigma amplified, posterior lobe rudimentary; capsule glabrous, 4-seeded, about 8 mm. long.

Distribution: southern Mexico.

Specimens examined:

Puebla: Chalmo y San Miguel, 1789-1794, *D. Luis Née* (Ma TYPE, M 928687, photograph); vicinity of Puebla at the Rancho Losado, alt. 2194 m., 29 Aug. 1909, *Bro. Nicolas 299* (US); vicinity of Puebla, date and number lacking, *Bro. Arsène* (US 1004058); Cerro Guadalupe, vicinity of Puebla, alt. 2200 m., June, 1908, *Arsène 1933* (M, G, US); entre les haciendas Santa

Barbara et Cristo, sur l'Alseseca, alt. 2150 m., 27 June, 1907, *Arséne* 1528 (US); Santa Barbara, Puebla, 1 June, 1907, *Arséne* 1075 (US, M).

Mexico: hills in the valley of Mexico, alt. 2500 m., 24 Aug. 1902, *Pringle* 11322 (G, US).

Michoacan: vicinity of Morelia, Punguato, alt. 2100 m., 16 July, 1909, *Arséne* 3044 (M, US); *Arséne* 52a (FM, US); Morelia, alt. 2000 m., 4 Aug. 1910, *Arséne* (US 1134412); vicinity of Morelia, north of Zapote, alt. 1950 m., 4 Aug. 1910, *Arséne* 5728 (M, G, US); vicinity of Morelia, Cuincho, alt. 1900 m., 1 July, 1909, *Arséne* 7303 (M, US).

25. *Dyschoriste saltuensis* Fernald, Proc. Am. Acad. 33: 92. 1898.

A slender, erect, suffrutescent plant; stems branching, subtetragonal, densely covered with short appressed hairs, ciliate at the nodes; leaves lanceolate, obtuse at the tips, tapering below into a short petiole, the lower cauline, 6 cm. long, 1.5 cm. broad, the upper scarcely half as large, above covered with cystoliths, beneath strigillose-pubescent on the midrib; flowers axillary, solitary or in glomerules of 2 to 5, peduncles 3 or 4 mm. long; bracts minute; calyx hirsute, 8–10 mm. long, divided half way to the base into 5 lance-subulate lobes; corolla light purple, pubescent without, 15 mm. or less in length, the slender tube equalling the calyx and spreading into a campanulate throat; lobes oblong, truncate, 4 mm. long; filaments hirsute, style hirsute; mature capsule approximately 10 mm. long, glabrous; seeds 4, flat, oblique.

Distribution: mountains of southwestern Mexico.

Specimens examined:

Guerrero: vicinity of Acapulco, Oct. 1894–March 1895, *Palmer* 506 (G TYPE, M, FM, Ch, US).

26. *Dyschoriste ciliata* (Nees) O. Ktze. Rev. Gen. Pl. 2: 486. 1891; Lindau in Engl. Bot. Jahrb. 19 (Beibl. 48): 15. 1894.

Calophanes ciliatus Nees in DC. Prodr. 11: 110. 1847.

Ruellia ciliata Ruiz in DC. Prodr. 11: 110. 1847.

Stem procumbent, glabrescent, with the apex and ascending

branches puberulent; lower leaves more or less spatulate, 3 cm. long, 1 cm. broad, upper leaves ovate to elliptic, 6–7 cm. long, 2–3 cm. broad, obtuse to acute at the apex, entire, nearly glabrous, the base cuneate-decurrent into a petiole about 1.5 cm. long; flowers axillary, in glomerules, subsessile, subtended by oblong, ciliate bracts; calyx 5-parted, 11 mm. long, joined for more than one-half the total calyx-length, lobes subulate-setaceous, ciliate; corolla infundibuliform, a little longer than the calyx; anthers slightly bicalcarate at the base.

Distribution: Peru.

Specimens examined:

Peru: near Huanuco, 1787, *Ruiz* (B TYPE, M fragment and photograph, 927773).

27. *Dyschoriste quadrangularis* (Oerst.) O. Ktze. Rev. Gen. Pl. 2: 486. 1891; Greenm. in Proc. Am. Acad. 33: 487. 1898.

Calophanes quadrangularis Oerst. Vidensk. Meddel. 120. 1854; Mueller in Walpers, Ann. 5: 647. 1858; Hemsl. in Biol. Cent.-Am. Bot. 2: 503. 1882.

Stem erect, 8–10 dm. high, distinctly quadrangular, with ciliated wings; cystoliths especially at the swollen nodes which are quite distant; leaves ovate, oblong, 7–10 cm. long, 2–3 cm. broad, acute at the apex, attenuate at the base into a petiole, repand, crenulate; flowers verticillate, in cymose clusters at the nodes; calyx 5-parted, 11 mm. long, subtended by short, subulate bracts, tube glabrous, lineolate, equalling or a little shorter than the lobes which are subulate-setaceous, canescent-pubescent along the nerves, ciliate; corolla subbilabiate, 11 mm. long, tube slightly shorter than the limb; stamens adnate to the middle of the corolla-tube; anthers oblong with basal appendages about 0.5 mm. long, filaments accrescent at point of attachment; capsule lanceolate, 8 mm. long, 4-seeded.

Distribution: eastern Mexico.

Specimens examined:

San Luis Potosi: Los Canoas, 29 Aug. 1891, *Pringle* 5020 (G).

Vera Cruz: Potrero de Consoquitla, Nov. 1841, *Liebmann* (G COTYPE); rocky soil, Zacuapan and vicinity, Oct. 1906, *Purpus* 2263 (M, G, FM).

28. *Dyschoriste quitensis* (HBK.) O. Ktze. Rev. Gen. Pl. 2: 486. 1891; Lindau in Bull. Herb. Boiss. 5: 679. 1897.

Calophanes quitensis (HBK.) Nees in DC. Prodr. 11: 110. 1847.

Ruellia quitensis HBK. Nov. Gen. 2: 240. 1817; Kunth, Syn. 2: 37. 1837.

Stem procumbent or ascending from a woody base, 3–4 dm. high, branched, somewhat quadrangular, puberulent; leaves oblong, elliptic-lanceolate, narrowed acutely at both ends, 25–32 mm. long, 10–12 mm. broad, entire, puberulent, constricted below into a short petiole; flowers axillary, subtended by lanceolate bracts which about equal the calyx in length; calyx 5-parted, 7–8 mm. long, united for about one-half the total calyx-length, nearly as long as the corolla, lobes subulate-setaceous, quite hirsute; corolla 8–9 mm. long, pubescent on the external surface; stamens and pistils typical of the genus; mature capsule 7–8 mm. long, acute at the apex, 4-seeded; seeds typical.

Distribution: mountains of Andes, Ecuador.

Specimens examined:

Ecuador: near Quito, around Panecilli, alt. 3000 m., *Humboldt* (B TYPE, M photograph); in Andes of Ecuador, 1857–59, *Spruce* 5989 (G).

29. *Dyschoriste maranhonis* (Nees) O. Ktze. Rev. Gen. Pl. 2: 486. 1891; Lindau in Engl. & Prantl, Nat. Pflanzenfam. 4^{3b}: 302. 1895.

Zahlbrucknera maranhonis Pohl. in Mart. Fl. Bras. 9: 26. 1847; DC. Prodr. 11: 108. 1847.

Calophanes maranhonis Nees in Mart. Fl. Bras. 9: 26. 1847; Nees in DC. Prodr. 11: 108. 1847.

Ruellia viscosa Pavon in Mart. Fl. Bras. 9: 26. 1847; DC. Prodr. 11: 108. 1847.

Stem ascending or erect from a perennial base, 1–1.5 dm. high, pubescent, densely so at the apex, branched; leaves oblong-ob lanceolate, 20–25 mm. long, 6–8 mm. broad, obtuse at the apex, tapering to a short-petiolate base, crenulate-subrepand, lower leaves hirsute, densely so on veins of lower surface, upper leaves subtomentose; flowers axillary, subtended by lanceolate bracts; calyx usually 5-parted, 7–8 mm. long, united for about one-half

the total calyx-length, pubescent, lobes subulate-setaceous, ciliate with long flaccid hairs; corolla approximately 14 mm. long, tube gradually amplified into the throat, pubescent on the internal as well as the external surface, occasionally only 4-lobed; stamens occasionally incompletely didynamous, the anthers sagittate, appendaged at both ends, acutely appendaged at the base; ovary glabrous, style filiform, pubescent, stigma coiled; capsule linear, 9–10 mm. long; seeds 4.

Distribution: southeastern Brazil.

Specimens examined:

Brazil: St. Ignacio, date lacking, *Sellow* (B TYPE, M fragment and photograph).

30. *Dyschoriste hirsuta* (Oerst.) O. Ktze. Rev. Gen. Pl. 2: 486. 1891.

Calophanes hirsutus Oerst. in Kjoeb. Vidensk. Meddel. 71. 1877–78.

Robust perennial, suffruticose at the base; stems erect, 4–6 dm. high, branched, at first pubescent, glabrate; leaves ovate, 15–20 mm. long, 9–12 mm. broad, subrepand, pubescent on both surfaces, petiolate, with the petiole 2–3 mm. long; flowers axillary, subtended by two oblanceolate bracts; calyx 5-parted, approximately 10 mm. long, lobes united for one-third the total calyx-length, subulate-setaceous, pubescent on the nerves, ciliate; corolla 15–16 mm. long, pale violet, pubescent on the external surface, tube and throat approximately equal in length; stamens and ovary typical of the genus.

Distribution: southeastern Brazil.

Specimens examined:

Brazil: on fields between Serra da Piedade and Lagoa Santa, 2 May, 1864, *Warming* (C TYPE, M fragment and photograph).

31. *Dyschoriste hygrophiloides* (Nees) O. Ktze. Rev. Gen. Pl. 2: 486. 1891; Lindau in Engl. & Prantl, Nat. Pflanzenfam. 4^{3b}: 302. 1895.

Calophanes hygrophiloides Nees in Mart. Fl. Bras. 9: 26. 1847; Nees in DC. Prodr. 11: 109. 1847.

Stems geniculate, ascending from a ligneous perennial base,

3–4 dm. high, pubescent; leaves petiolate, 2–3.5 cm. long, 1–2 cm. wide, lower leaves obovate-subrotund, more or less emarginate at the apex, attenuate at the base into a rather short petiole, upper leaves elliptic-ovate, softly pubescent on both surfaces, margin somewhat sinuous; inflorescence axillary, in glomerules of 2–5 flowers; bracts linear-oblongate, setaceous, pubescent, shorter than the calyx, resembling calyx-lobes, bracteoles present; calyx 5-parted, total length approximately 13 mm., lobes 7–8 mm. long, extremely setaceous, villous-ciliate; corolla somewhat bilabiate, puberulent on the external surface, 13–14 mm. long, tube and throat of about equal length; stamens adnate below the middle of the corolla limb, anther cells ovate; style filiform, quite pubescent, 4 mm. or less in length; stigma curved, mature capsule not seen.

Distribution: southeastern Brazil.

Specimens examined:

Brazil: in grassy fields, Parana, 10 Oct. 1914, *Dusén 15640* (G, M photograph).

32. *Dyschoriste repens* (Nees) O. Ktze. Rev. Gen. Pl. 2: 486. 1891; Lindau in Engl. & Prantl, Nat. Pflanzenfam. 4^{3b}: 302. 1895.

Calophanes repens Nees in DC. Prodr. 11: 109. 1847.

Ruellia repens Ruiz acc. to Nees in DC. Prodr. 11: 109. 1847, in synonymy.

Stem spreading, ascending, geniculate from a perennial base, densely pubescent, branching; branches rather short, ascending, densely foliate; leaves obovate (lower) to ovate (upper), 2.5–3.5 cm. long, approximately 1 cm. broad, obtuse to acute at the apex, tapering at the base to a distinct petiole, ciliate, entire, hirsute on the upper surface, pubescence of unequal hairs on the midrib of the under surface; flowers axillary, subtended by foliaceous bracts; calyx 5-parted, 10–11 mm. long, nearly equalling the corolla, lobes united for about one-half the total length of the calyx, subulate-setaceous, conspicuously ciliate; corolla 11–12 mm. long, pubescent on the external surface, tube comparatively broad, short; ovary 2-celled, style filiform, pubescent, 6 mm. long, stigma oblique; capsule not seen.

Distribution: Peru.

Specimens examined:

Peru: "near Cheuchin," date lacking, *Ruiz* (B TYPE, M fragment and photograph).

33. *Dyschoriste Pulegium* (Nees) O. Ktze. Rev. Gen. Pl. 2: 486. 1891.

Calophanes Pulegium Nees in Mart. Fl. Bras. 9: 25. 1847; Nees in DC. Prodr. 11: 109. 1847.

Stem erect from a suffruticose base, subvelutinous-pubescent; leaves sessile, obovate, 2–2.5 cm. long, approximately 1 cm. broad, obtuse at the apex, tapering at the base, crenulate; flowers axillary in sessile glomerules; calyx 5-parted, 9–10 mm. long, hirsute, joined one-quarter the distance from the base, lobes subulate-setaceous, ciliate; corolla about twice the total calyx length; stamens and pistils typical of the genus; mature capsule lanceolate, 4-seeded.

Distribution: southeastern Brazil.

Specimens examined:

Brazil: date and exact locality lacking, *Sellow 173* (B TYPE, M photograph).

34. *Dyschoriste ovata* (Cav.) O. Ktze. Rev. Gen. Pl. 2: 486. 1891; Lindau in Engl. & Prantl, Nat. Pflanzenfam. 4^{3b}: 302. 1895; Lindau in Bull. Herb. Boiss. 5: 678. 1897.

Calophanes ovatus Benth. in DC. Prodr. 11: 108. 1847, as to Cavanilles plant (not Hartweg plant); Hemsl. in Biol. Cent.-Am. Bot. 2: 502. 1882.

Ruellia ovata Cav. Ic. 3: 28, pl. 254. 1794; Willd. Sp. Pl. 3: 363. 1801.

Erect perennial, 4–6 dm. high; stems quite quadrangular, pubescent, sometimes winged, occasionally branched; leaves ovate, obovate or occasionally elliptical, 3–4 cm. long, 1–1.7 cm. broad, obtuse at the apex, attenuated at the base into a very short petiole, quite glabrous with the exception of occasional stiff hairs on the midrib and veins, cystoliths abundant, giving the appearance of appressed hairs, margin entire and ciliated, sometimes slightly repand-crenulate; flowers crowded among the foliaceous bracts at the nodes, giving a glomerulate appearance; calyx 5-parted, quite glabrous, covered with cystoliths, 14–15

mm. long, joined for about one-third the total calyx-length, lobes subulate-setaceous, ciliate; corolla 20–25 mm. long, tube less than 10 mm. long, puberulent on the external surface; stamens, pistil, and fruit typical of the genus.

Distribution: southern Mexico.

Specimens examined:

Vera Cruz: Nogales, Mt. Orizaba, alt. 1400 m., 16 Aug. 1891, *Seaton 392* (Ch, G); Borrego, near Mt. Orizaba, 26 Aug. 1866, *Bourgeau 2903* (US, G).

Morelos: near Cuernavaca, 30 July, 1906, *Pringle 13838* (US); near Cuernavaca, alt. 1500 m., 28 July, 1896, *Pringle 7249* (US).

Michoacan: Morelia, alt. 2100 m., 8 Aug. 1912, *Arséne 9027* (US).

35. *Dyschoriste amoena* (Nees) O. Ktze. Rev. Gen. Pl. **2**: 485. 1891; Lindau in Engl. & Prantl, Nat. Pflanzenfam. **4**^{3b}: 302. 1895.

Calophanes amoenus Nees in Mart. Fl. Bras. **9**: 27. 1847; Nees in DC. Prodr. **11**: 110. 1847.

Stem ascending from a perennial base, approximately 3 dm. high, geniculate, branched, puberulent toward the apex, otherwise glabrous; leaves narrowly oblong-ovate to slightly oblong-ob lanceolate, 4–5 cm. long, 1–1.5 cm. broad, obtuse to acute at the apex, entire, glabrous, attenuate at the base into a very short petiole; inflorescence axillary, bracteate, glomerulate toward the apex; calyx deeply 5-parted, 2 cm. long, quite robust, pubescent, lobes less attenuate than in the majority of species, ciliate; corolla 5 mm. or more longer than the calyx, pubescent on the external surface; stamens and ovary typical of the genus; mature capsule not seen.

Distribution: southeastern Brazil.

Specimens examined:

Brazil: date and exact locality lacking, *Sellow* (B TYPE, M photograph and fragment).

36. *Dyschoriste xylopoda*¹ n. sp.

Pl. 15.

¹ *Dyschoriste xylopoda* Kob., sp. nov., caulibus erectis vel ascendentibus, basi crasse lignose, 2–3 dm. altis, villosa-pubescentibus; foliis sessilibus, lanceolato-oblongis, inferioribus rare ovatis, 2.5–3.5 cm. longis, 1 cm. minusve latis, integerrimis;

Stems strict, rising from a thick woody base to a height of 2–3 dm., villous-pubescent throughout; leaves sessile or nearly so, lanceolate-oblong, or the lowermost occasionally ovate, 2.5–3.5 cm. long, approximately 1 cm. or less broad, entire; flowers 2–3 on a short peduncle in the axils of the leaves, subtended by linear-lanceolate bracts which are a little shorter than the calyx; calyx deeply 5-cleft, 17–18 mm. long, lobes 11–12 mm. long, subulate-setaceous, villous-ciliate; corolla 25–27 mm. long, pubescent on the external surface, tube 10 mm. long; stamens adnate below the middle of the corolla limb, anthers oblong-ovate, 2–3 mm. long; ovary 2-celled, glabrous, style filiform, 20 mm. long, pubescent, stigma linear, oblique, nearly 2 mm. long; mature fruit not seen.

Distribution: southern Mexico.

Specimens examined:

Jalisco: hills near Guadalajara, 19 July, 1893, *Pringle 4442* (M TYPE, G, FM).

37. *Dyschoriste oblongifolia* (Michx.) O. Ktze. Rev. Gen. Pl. 2: 486. 1891; Lindau in Engl. & Prantl, Nat. Pflanzenfam. 4^{3b}: 302. 1895. Pl. 3.

Ruellia oblongifolia Michx. Fl. Bor.-Am. 2: 23. 1805; Pursh, Fl. Am. Sept. 2: 420. 1814.

? *Ruellia biflora* L. Sp. Pl. 2: 635. 1753 (a doubtful synonym—refer to D. Don in Sweet's Brit. Fl. Garden).

Calophanes oblongifolia (Michx.) D. Don in Sweet, Brit. Fl. Gard. 2: pl. 181. 1833; Gray, Syn. Fl. N. Am. ed 1, 2¹: 324. 1878, and ed. 2, 1886; Chapman, Fl. Southeastern U.S. ed. 3, 365. 1897; Britt. & Brown, Ill. Fl. 3: 202. 1898; Small, Fl. Southeastern U.S. ed. 1, 1083. 1903, and ed. 2, 1913.

Dipteracanthus biflorus Nees in Linnaea 16: 294. 1842.

Dipteracanthus oblongifolius Chapman, Fl. Southeastern U.S. ed. 2, 303. 1889.

floribus 2–3, pedicellatis, axillaribus; bracteis linearo-lanceolatis, calyce haud paulo brevior; calyce profunde 5-diviso, 17–18 mm. longo, lobis 11–12 mm. longis; subulato-setaceis, villosociliatis; corolla 25–27 mm. longa, extus puberulenta, tubo 10 mm. longo; filamentis basi connatis, antheris ovato-oblongis, 2–3 mm. longis; stylo 20 mm. longo, pubescente, stigmata lineari, obliqua, prope 2 cm. longa; capsula ignota. —TYPE collected on hills, near Guadalajara, Jalisco, Mexico, 19 July 1893, *C. G. Pringle 4442* (M).

Herbaceous perennial; stem quadrangular, branched at the base, erect, pubescent or softly hirsute, 4–8 dm. high; leaves sessile or short-petiolate, oblong-ovate, 2.5–4.5 cm. long, 0.5–1.5 cm. broad, rounded or obtuse at the apex, narrowed at the base, entire or slightly crenulate, softly hirsute; flowers solitary, axillary on very short pedicels, subtended by narrowly oblong, leafy bracts; calyx 15–18 mm. long, deeply 5-parted, subulate-setaceous, lobes ciliate; corolla blue, usually purple-maculate in the throat, approximately 25–27 mm. long, the tube shorter than the abruptly amplified throat, puberulent on the external surface, lobes rounded; filaments slightly pubescent at point of adnation; anther cells oblong; mature capsule 10–12 mm. long, lanceolate; seeds 4, flattened, oblique.

Distribution: sandy pine barrens, southern Virginia to Florida.

Specimens examined:

Virginia: date and locality lacking, probably southeastern portion of the state, *Thurber* (G).

South Carolina: sandy ground, north of Graniteville, Aiken Co., 21 May, 1899, *Eggert* (M); locality lacking, May, 1867, *Ravenel* (G, US); barrens near Beaufort, Beaufort Co., 26 April, 1917, *Churchill* 743 (M).

Georgia: sand hills between Grovetown and Forrest, Columbia Co., 10 June, 1902, *Harper* 1312 (M, G, US); low places north of Belair, Richmond Co., 22 May, 1899, *Eggert* (M); Ocmulgee River swamp below Macon, Laurens Co., *Small* (FM); Savannah, Chatham Co., 1842, *Curtis* (M); Darien Junction, McIntosh Co., 31 May, 1909, *H. H. Smith* 2219 (FM); Darien Junction, McIntosh Co., alt. sea level, 25–27 June, 1895, *Small* (FM); Lexington, Oglethorpe Co., 1836, *Short* (M).

Florida: sandy pine lands, date and exact locality lacking, *Mohr* (US 721388); eastern Florida, 1895, *Curtiss* (US); pine barrens, Duval Co., 21 April, 1902, *Fredholm* 5101 (G, US); pine barrens, Duval Co., 28 April, 1902, *Fredholm* 5127 (G); near Jacksonville, Duval Co., 2 May, 1893, *Curtiss* 4428 (M, US); dry pine barrens, near Jacksonville, Duval Co., 8 May, 1894, *Curtiss* 4667 (FM, US); Jacksonville, Duval Co., April, 1869, *Canby* (M, G, US); dry pine barrens, near Jacksonville, Duval Co., *Curtiss* 1938 (M, G, US); south Jacksonville, Duval Co., 7 April,

1897, *Churchill* (G); dry sandy pine barrens, St. Augustine, St. Johns Co., May–Aug. 1875, *Reynolds* (M); sandy pine barrens, DeLand, Volusia Co., date lacking, *Harkness* (M); dry pine woods, DeLand, Volusia Co., 7 May, 1910, *Hood* (M); vicinity of Eustis, Lake Co., June–July, 1894, *Hitchcock* 1454 (FM, M); Eustis, Lake Co., 26 April, 1896, *Webber* 520 (M); sandy soil, high pine lands, vicinity of Eustis, Lake Co., *Nash* 184 (M, G, US); Eustis, Lake Co., 28 May–15 June, 1895, *Nash* 1774 (US); Winter Park, Orange Co., March, 1900, *Huger* 19 (M); Clarcona, Orange Co., 18–22 Aug. 1899, *Pieters* 121 (US); dry sand, Okeechobee region, Brevard Co., 2 June, 1903, *Fredholm* 5870 (G); Lake City, Jefferson Co., June–July, 1898, *Hitchcock* 1452, 1453 (FM); Rosewood, Levy Co., June, 1876, *Garber* (FM); dry sandy ground, Polk Co., 12 April, 1894, *Ohlinger* 1415 (FM); dry land, Polk Co., 11 June, 1894, *Ohlinger* 188, 1437 (FM); Lake Alfred, Polk Co., 11 June, 1922, *Armstrong & Armstrong* (M); Polk Co., March, 1890, *Milligan* (US); pine barrens, Tampa, Hillsborough Co., Aug. 1898, *Ferguson* (M); in pine lands near St. Petersburg, Pinellas Co., 10 Nov. 1907, *Deam* 2832 (G); pine woods, Manatee Co., 16 March, 1887, *Rothrock* (FM 160054, 322461); sandy field, Bradentown, Manatee Co., 15 May, 1900, *Tracy* 6683 (M); Fort Myers, Lee Co., 1904, *Westgate* 3607 (FM); Fort Myers, Lee Co., July–Aug. 1900, *Hitchcock* (FM); Aspalaga, Liberty Co., May, 1898, *Chapman* (M).

Alabama: date and locality lacking, *Buckley* (M, US).

37a. *Dyschoriste oblongifolia* (Michx.) O. Ktze. forma *glabra* n. f.
Stem and leaves glabrous; otherwise as the species.

Distribution: Florida.

Specimens examined:

Florida: Toco, St. Johns Co., 1874, *Palmer* 346 (M, G); Lake City, Columbia Co., 4 May, 1893, *Rolf* 190 (M, FM); Gainesville, Alachua Co., 5 June, 1910, *Hood* (M); Fort Myers, Lee Co., July–Aug. 1900, *Hitchcock* (M); cypress swamp and low pine land, vicinity of Fort Myers, Lee Co., 8 May, 1916, *J. P. Standley* 179 (M, G, FM, US); in pine land, Mullock Creek District, about 8 miles southeast of Fort Myers, Lee Co., May–June, 1917, *J. P. Standley* 443 (M, G, FM, US); in pine land, vicinity of Fort

Myers, Lee Co., 12 May, 1916, *J. P. Standley 13* (M, G, FM, US); pine woods, vicinity of Fort Myers, Lee Co., 28 Feb. 1916, *J. P. Standley 12852* (US); vicinity of Fort Myers, Lee Co., 29 Feb. 1916, *J. P. Standley 12917* (US); moist pine lands, vicinity of Fort Myers, Lee Co., 14 Dec. 1919, *P. C. Standley 18894* (US); high pine land, Jessamine, 17–20 April, 1899, *Barnhart 2680* (FM).

38. *Dyschoriste humilis* (Griseb.) Lindau in Engl. Bot. Jahrb. 19(Beibl. 48): 15. 1894; Lindau in Bull. Herb. Boiss. II. 3: 628. 1903.

Ruellia geminiflora Kth. var. *humilis* Griseb. in Pl. Lor. 176. 1874, and Symb. Argent. 259. 1879.

Stem slender, branched below, ascending from a ligneous, perennial base, pubescent; leaves oblong-elliptic, 2–3.5 cm. long, 0.4–0.5 cm. broad, tapering acutely both at the apex and at the short-petiolate base, puberulent, ciliate, entire or sinuous; flowers in twos or threes, axillary, subtended by foliaceous bracts about 8–10 mm. long; calyx in anthesis approximately 14 mm. long, puberulent, lobes setaceous, 8 mm. long, at maturity the calyx sometimes attains a length of 20 mm.; corolla 21–22 mm. long, puberulent on the external surface, tube shorter than the broadly amplified (8–9 mm. in diameter) throat; stamens adnate below the middle of the corolla throat, anther cells oblong, a little over 2 mm. long, cells of individual anthers often differing, one base distinctly acute and minutely apiculated, the other base blunt or slightly mucronate, apex of cells slightly acute; style sparsely pubescent, filiform, 19 mm. long, stigma about 2 mm. long, posterior lobe rudimentary; mature capsule exceeding the calyx lobes, 10 mm. long; retinaculum in center of each cell; seeds two, flat, oblique.

Distribution: Argentina.

Specimens examined:

Argentina: Chaco Santafichna, Mocovi, 5 Nov. 1903, *Venturi 55* (US); Cordoba, Dec. 1891, *Kuntze* (US 701502); Cordoba, 21 Dec. 1876, *Hieronymus* (FM 51116, US 282198); near the city of Cordoba, 1874–75, *Hieronymus* (FM 51115a, US 282197).

39. *Dyschoriste paraguariensis*¹ n. sp.

Pl. 16.

Stems erect, 2–3 dm. high, strict, somewhat quadrangular, nearly glabrous, sparsely pubescent at the nodes; leaves sessile, lanceolate-elliptic, 2–2.5 cm. long, 0.5–0.8 cm. wide, acute at the apex, glabrous, covered with an irregular scattering of cystoliths, margins entire, not ciliated; flowers in twos, axillary, subtended by two foliaceous bracts which resemble the leaves in nearly every respect; calyx glabrous, except for the ciliation on the lobes, covered with a regular array of cystoliths, 14 mm. long at maturity, lobes lanceolate, setaceous, 10 mm. long; corolla approximately 18 mm. long, puberulent on the external surface, tube about 9 mm. long; style filiform, about 12 mm. long, pubescent, stigma oblique; mature capsule linear, 11–12 mm. long, glabrous, 4-seeded; seeds flattened.

Distribution: Paraguay.

Specimens examined:

Paraguay: in region of the river "Tapiraguay," Aug., Hassler 4355 (G, TYPE).

40. *Dyschoriste Tweediana* (Nees) O. Ktze. Rev. Gen. Pl. 2: 486. 1891.

Calophanes Tweedianus Nees in DC. Prodr. 11: 108. 1847.

Stem ascending from a perennial base, 4–6 dm. high, pubescent; leaves ovate-elliptic, 3–3.5 cm. long, 0.9–1.5 cm. broad, acute to obtuse at the apex, tapering at the base into a very short petiole, repand-subcrenate, glabrous; flowers axillary, 1–3 aggregated on very short peduncles in the axils, subtended by oblong-lanceolate bracts which are shorter than the calyx; calyx deeply 5-parted, pubescent, 14 mm. long, lobes subulate-setaceous, ciliate; corolla infundibuliform, 5-lobed, 20 mm. long, tube 8 mm. long, pubescent on the external surface, lobes ovate, obtuse; anthers

¹ *Dyschoriste paraguariensis* Kob. sp. nov., caulibus erectis, 2–3 dm. altis, strictis plus minusve quadrangularis, subglabris, parum pubescentibus ad nodos; foliis sessilibus, lanceolato-ellipticis, 2–2.5 cm. longis, 0.5–0.8 cm. latis, apice acutis, glabris, lineolatis; floribus duobus in axillaribus, bracteis duobus, foliaceis; calyce glabro, cystolithero, 14 mm. longo, lobis lanceolatis, setaceis, 10 mm. longis; corolla violacea, 18 mm. longa, extus puberula, tubo 9 mm. longo; filamentis basi connatis; stylo 12 mm. longo, piloso; capsula lineari, 11–12 mm. longa, glabra, 4-sperma; seminibus planis.—TYPE collected in the region of the river "Tapiraguay," Paraguay, Aug., Hassler 4355 (G).

appendaged at the base, appendages connivent (according to Nees); seeds suborbicular, flattened.

Distribution: southeastern Brazil.

Specimens examined:

Brazil: in dry mountain forests in Prov. Bonar, at river Jacuhy in Rio Grande do Sul, date lacking, *Tweedie* 771 (K TYPE, M photograph).

EXCLUDED SPECIES

Calophanes californica Rose acc. to Vasey & Rose in Contr. U.S. Nat. Herb. **1**: 85. 1890 = *Ruellia californica* (Rose) Johnston in Proc. Cal. Acad. Sci. IV, **12**: 1171. 1924.

Calophanes cubensis A. Rich. in Sagra, Hist. de Cuba **11**: 160. 1850 = *Hygrophila brasiliensis* (Spreng.) Lindau in Urb. Symb. Ant. **2**: 183. 1900.

Calophanes Palmeri Gray acc. to Watson in Proc. Am. Acad. **22**: 443. 1887 = *Spigelia scabrella* Benth. Pl. Hartweg. 45. 1840.

Calophanes peninsularis Rose acc. to Vasey & Rose in Contr. U. S. Nat. Herb. **1**: 75. 1890 = *Ruellia peninsularis* (Rose) Johnston in Proc. Cal. Acad. Sci. IV, **12**: 1172. 1924.

Dyschoriste candida Brandegees in Zoe **5**: 242. 1908 = *Ruellia candida* (Brandegees) Kobuski, n. comb.

Dyschoriste cubensis Urb. Symb. Ant. **7**: 381. 1912 = *Apasalus cubensis* (Urb.) Kobuski in Ann. Mo. Bot. Gard. **15**: 2. 1928.

Dyschoriste diffusa Urb. Symb. Ant. **7**: 380. 1912 = *Apasalus diffusus* (Urb.) Kobuski in Ann. Mo. Bot. Gard. **15**: 1. 1928.

Dyschoriste humistrata (Shuttl.) O. Ktze. Rev. Gen. Pl. **2**: 486. 1891 = *Apasalus humistratus* (Shuttl.) Kobuski in Ann. Mo. Bot. Gard. **15**: 3. 1928.

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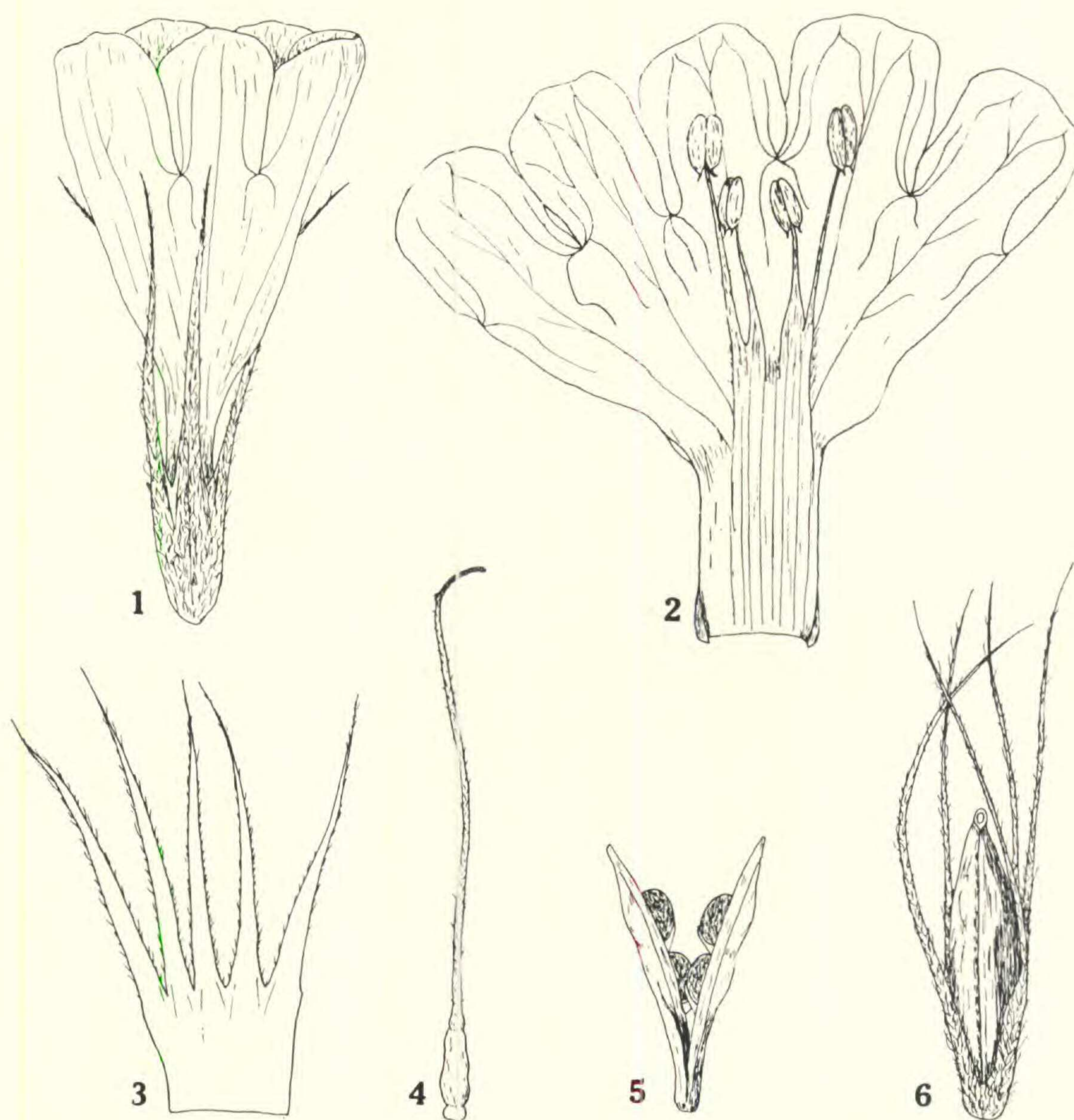
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EXPLANATION OF PLATE

PLATE 3

- Fig. 1. Flower of *D. oblongifolia* (Michx.) O. Ktze. $\times 3$.
Fig. 2. Open corolla of *D. oblongifolia* (Michx.) O. Ktze. $\times 3$. Showing character and position of stamens.
Fig. 3. Open calyx of *D. oblongifolia* (Michx.) O. Ktze. $\times 3$.
Fig. 4. Pistil of *D. oblongifolia* (Michx.) O. Ktze. $\times 3$.
Fig. 5. Dehiscing capsule of *D. oblongifolia* (Michx.) O. Ktze. $\times 3$. Showing position of retinacula and seeds.
Fig. 6. Mature capsule (before dehiscence) of *D. oblongifolia* (Michx.) O. Ktze. $\times 3$. Showing the persistent calyx.



EXPLANATION OF PLATE

PLATE 4

Dyschoriste trichanthera Kobuski

From the type specimen, *Hassler 7780*, in the Gray Herbarium of Harvard University.



KOBUSKI—MONOGRAPH OF DYSCHORISTE

EXPLANATION OF PLATE

PLATE 5

Dyschoriste Purpusii Kobuski

From the type specimen, *Purpus* 2362, in the herbarium of the Missouri Botanical Garden.



KOBUSKI—MONOGRAPH OF DYSCHORISTE

EXPLANATION OF PLATE

PLATE 6

Dyschoriste Greenmanii Kobuski

From the type specimen, *Palmer 492*, in the United States National Herbarium



KOBUSKI—MONOGRAPH OF DYSCHORISTE

EXPLANATION OF PLATE

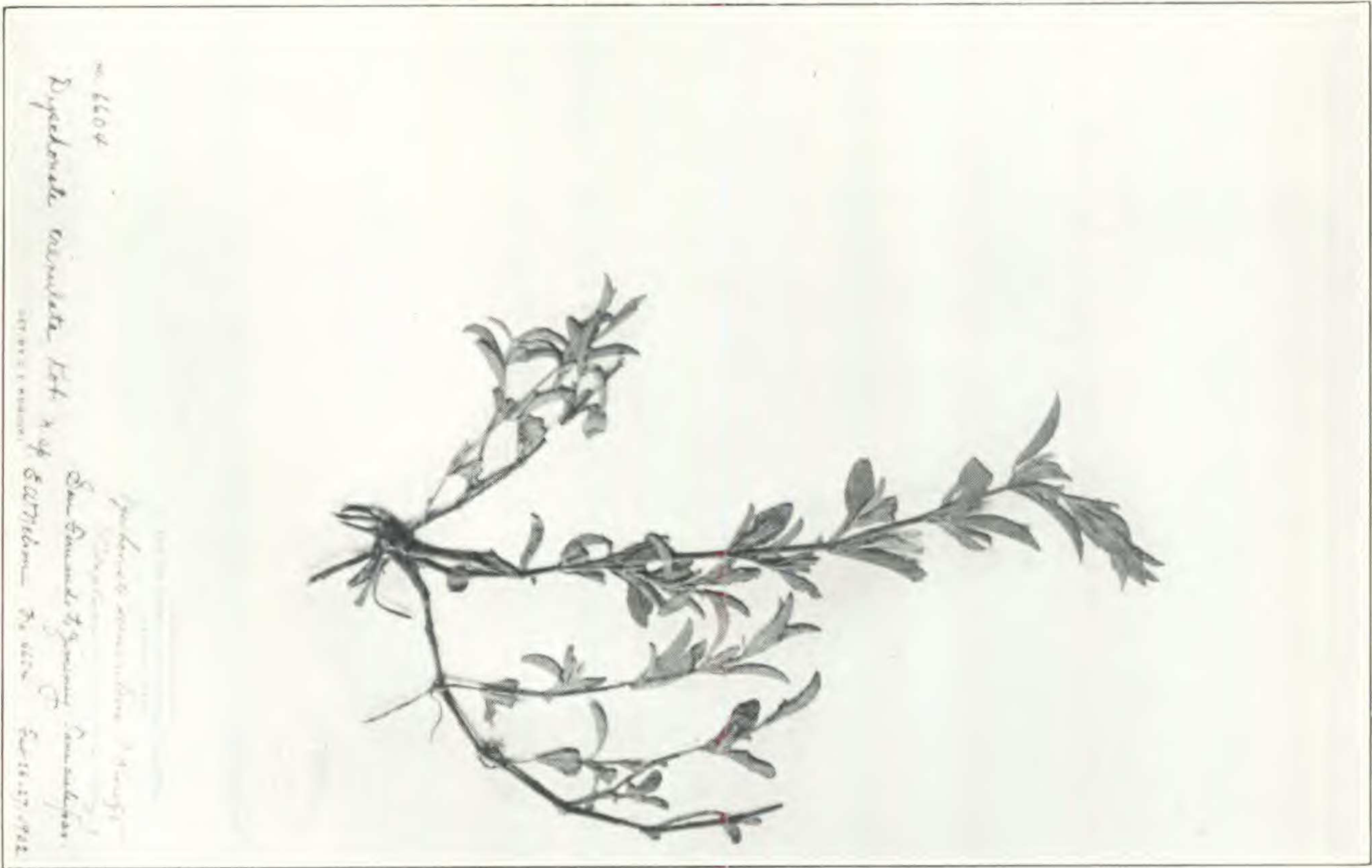
PLATE 7

Fig. 1. *Dyschoriste Rosei* Kobuski

From the type specimen, *Rose 2259*, in the United States National Herbarium

Fig. 2. *Dyschoriste crenulata* Kobuski

From the type specimen, *Nelson 6604*, in the Gray Herbarium of Harvard University.



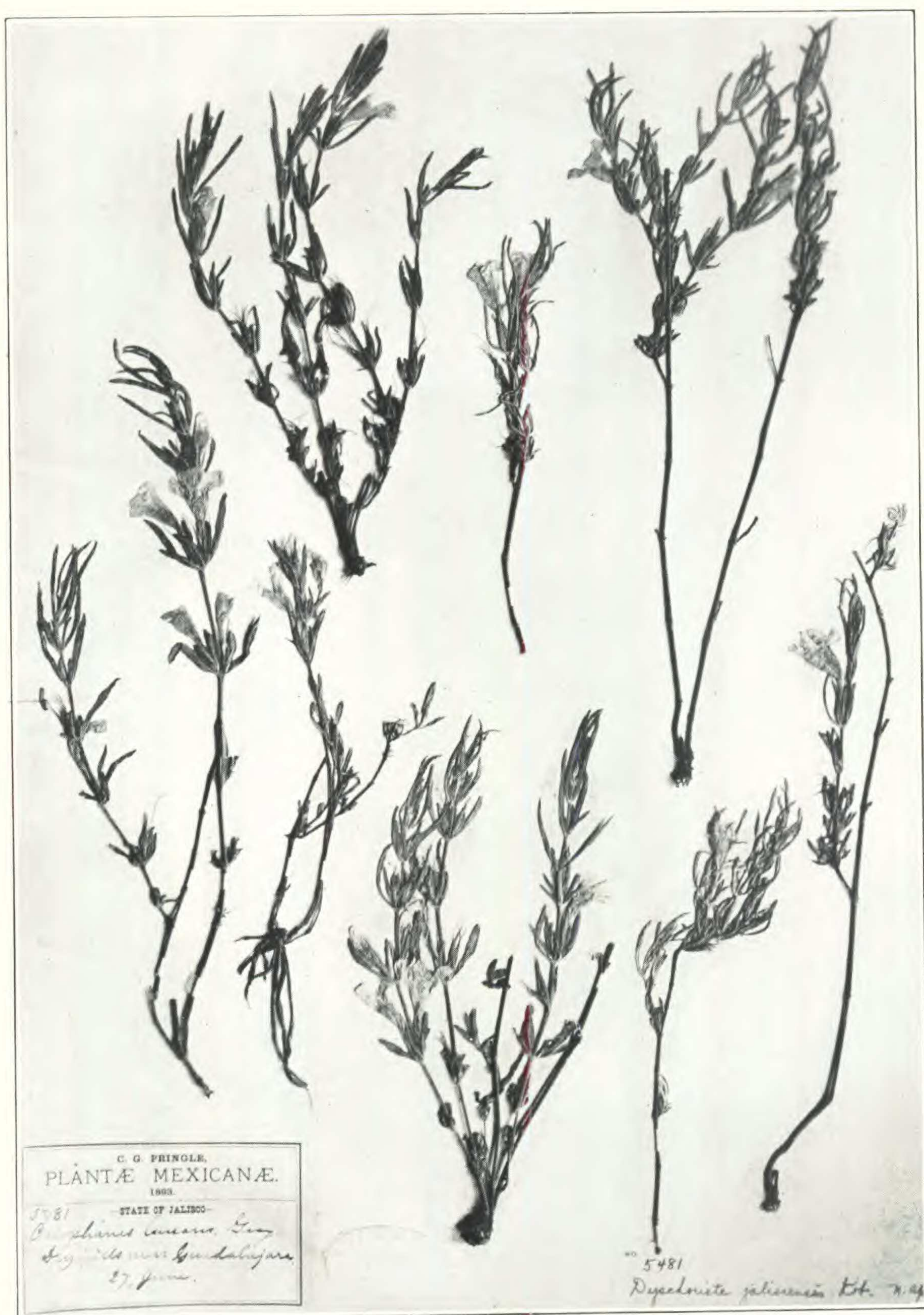
KOBUSKI—MONOGRAPH OF DYSCHORISTE

EXPLANATION OF PLATE

PLATE 8

Dyschoriste jaliscensis Kobuski

From the type specimen, *Pringle 5481*, in the Gray Herbarium of Harvard University



KOBUSKI—MONOGRAPH OF DYSCHORISTE

EXPLANATION OF PLATE

PLATE 9

Dyschoriste bilabiata (Seem.) O. Ktze.

From the type specimen, *Seeman 1513*, in the Royal Botanic Gardens at Kew, England.



KOBUSKI—MONOGRAPH OF DYSCHORISTE

EXPLANATION OF PLATE

PLATE 10

Dyschoriste oaxacensis Kobuski

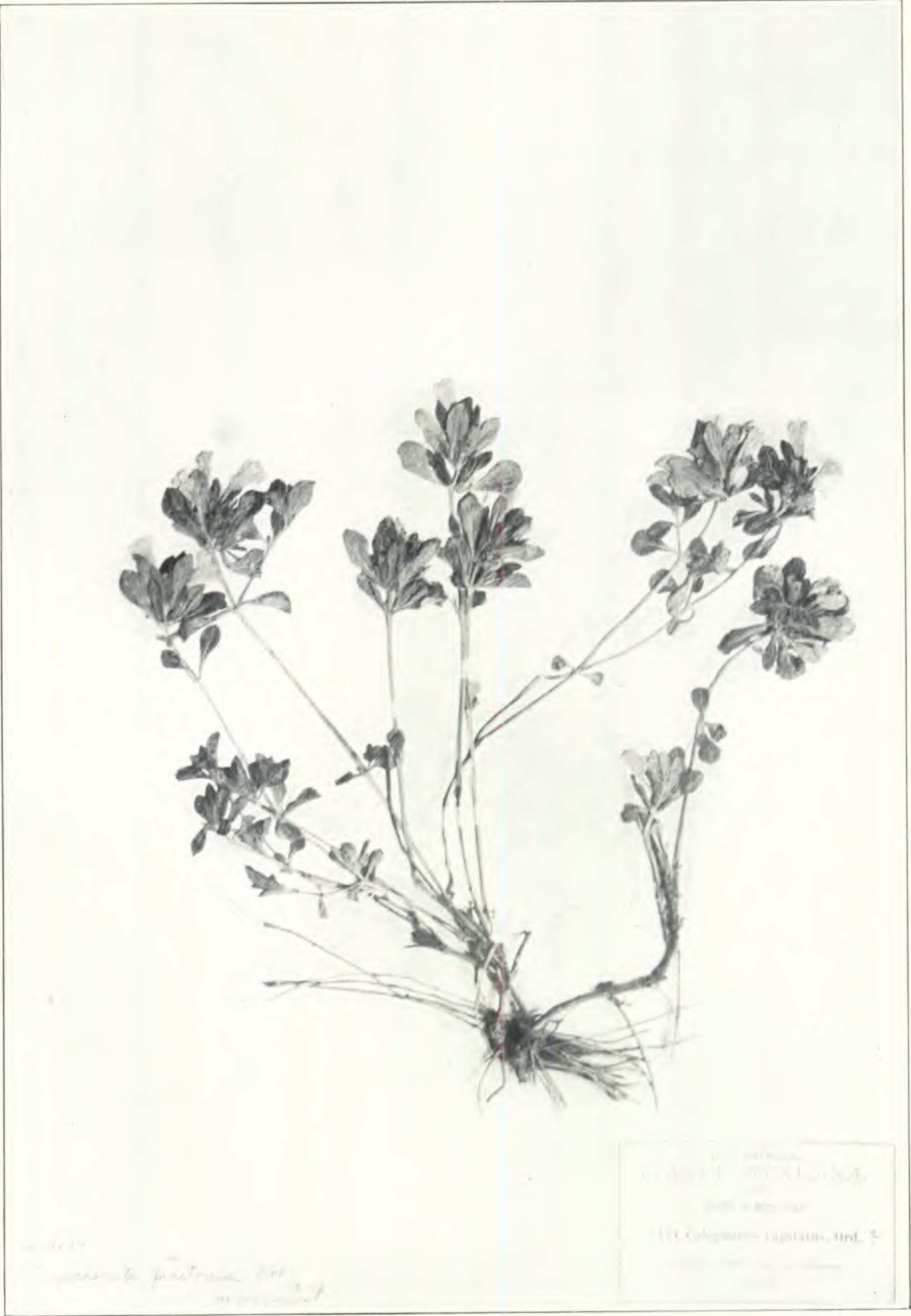
From the type specimen, *Pringle 6712*, in the herbarium of the Missouri Botanical Garden.

EXPLANATION OF PLATE

PLATE 11

Dyschoriste pinetorum Kobuski

From the type specimen, *Pringle 4134*, in the Gray Herbarium of Harvard University.



KOBUSKI—MONOGRAPH OF DYSCHORISTE

EXPLANATION OF PLATE

PLATE 12

Dyschoriste sagittata Kobuski

From the type specimen, *Fiebrig 6383*, in the Gray Herbarium of Harvard University.



KOBUSKI—MONOGRAPH OF DYSCHORISTE

EXPLANATION OF PLATE

PLATE 13

Dyschoriste Lloydii Kobuski

From the type specimen, *Lloyd 199*, in the United States National Herbarium.



KOBUSKI—MONOGRAPH OF DYSCHORISTE

EXPLANATION OF PLATE

PLATE 14

Dyschoriste microphylla (Cav.) O. Ktze.

From the type specimen, *D. Luis Née*, in the herbarium of the Botanical Garden, Madrid, Spain.



EXPLANATION OF PLATE

PLATE 15

Dyschoriste xylopoda Kobuski

From the type specimen, *Pringle 4442*, in the herbarium of the Missouri Botanical Garden.



KOBUSKI—MONOGRAPH OF DYSCHORISTE

EXPLANATION OF PLATE

PLATE 16.

Dyschoriste paraguariensis Kobuski

From the type specimen, *Hassler 4355*, in the Gray Herbarium of Harvard University.